THE MEDICAL NEWS.

A WEEKLY JOURNAL OF MEDICAL SCIENCE.

VOL. LVIII. SATURDAY, MAY 16, 1891. NO. 20.

ORIGINAL ARTICLES.

MINOR UTERINE SURGERY.

BY J. M. BALDY, M.D.,
PROFESSOR OF GYNECOLOGY IN THE PHILADELPHIA POLYCLINIC AND COLLEGE FOR GRADUATES IN MEDICINE.

IN these days of uterine and pelvic surgery the minor operations on the uterus, of which we used to hear so much, have been in great measure lost sight of by students of the diseases of women. In consequence of this very fact of being overshadowed by newer and more alluring procedures, fortunately many of the abuses of the old days have disappeared from the practice of those working in gynecology in our large medical centres. Unfortunately, this is not equally true of the vast majority of practitioners, either in the cities or in the rural districts; the old teachings and the old books still manifest too much influence. The time has come when we should carefully look back over our work of the past few years and see what lessons it has taught us.

The one great fact which stands staring us in the face in this connection is, that most of the troubles which we have been in the habit of considering as situated in the uterus are not in that organ at all. Thus, at one sweep we are able to dispose of a large proportion of the so-called uterine diseases. It is then manifestly improper and dangerous to direct treatment to the uterus when that organ is perfectly healthy, and the trouble is situated in the neighboring tissues—most probably of an inflammatory nature. In a large proportion of the remaining so-called uterine diseases the womb itself is undoubtedly affected, but the lesion in the uterus is only secondary to a lesion in the uterine appendages, or, if it was the seat of the primary disease, its continuance is surely due to the inflammatory condition of the contiguous organs. Here, again, a treatment directed against the uterus itself is both irrational and dangerous. This leaves us but a comparatively small number of cases of pure uterine disease. Such is the true situation. Uterine disease such as metritis, endometritis, pathological displacements, etc., uncomplicated by other and more serious troubles, is the exception rather than the rule, and in a large dispensary practice during the past few years the small number of such cases which have come under observation has been a matter of surprise to me.

It would seem, then, that the old methods proposed for the treatment of uterine diseases were not in themselves necessarily faulty, although most of them have undoubtedly been carried to excess, but that the trouble lay in faulty diagnosis, and consequent application of methods of treatment unsuitable for the true disease. If the true lesion be overlooked, and many of the minor operations be performed, the result is sure to be disastrous in a certain proportion of cases. How often an acute pelvic inflammation will be lit up will depend in great part on how carefully the given manipulation is carried out.

All this being true, there still remain a certain proportion of diseases which are uterine, pure and simple. The fact that in the past so many mistakes in diagnosis have been made, and that disastrous results have followed the application of certain treatments, should not blind us to the value of these same methods in cases in which they are properly applicable; and yet at the same time a proper limit should be put to their use.

The Uterine Sound.—On the whole, it had been better for womankind had this instrument never been invented. For the application of the electric current it has its uses, and in an occasional case where one is uncertain as to the connection of the uterus with a given tumor it may possibly give some definite information. For the purpose of measuring the depth of the uterine cavity, or for locating the position of the fundus, as it is generally used, it is absolutely superfluous. Anyone who is forced to use it for these purposes, unless it be in rarely exceptional cases, must confess to himself his lack of even an ordinary amount of manual dexterity. For replacing a displaced womb it is a dangerous instrument, and its use is very painful. A movable uterus can be invariably replaced by bimanual manipulation, with the patient on the back, or in the knee-chest position, with the aid of a tenaculum and a repositor. If the organ is adherent it no longer comes under the head of simple uterine disease, and should then be dealt with by other and safer procedures. The uterine sound may be used with perfect safety in careful hands; but, as ordinarily employed, it is capable of causing considerable traumatism, and of carrying septic material into the uterine cavity.

Dilatation.—This operation is one which has been much abused. It is capable of much good or much harm, depending upon whether it is used carefully

and in suitable cases or not. Personally, I have never had any permanent bad results follow its use. On the contrary, I have seen severe dysmenorrhœa relieved and even permanently cured: in not a small proportion of cases have I observed pregnancy follow dilatation. Patients have come to me suffering from a pelvic inflammation following a dilatation performed by others, but everything pointed to the fact that the pelvic disease had existed first and that the operation had been performed probably under a mistaken diagnosis for the relief of symptoms produced by the diseased appendages. In but one case have I had an inflammatory attack follow this operation when there was no complicating disease. In that case I made an incomplete dilatation without ether upon the dispensary table, in a young woman, married for five years and sterile. The inflammatory attack cleared up within a week, she soon conceived, and a month ago I delivered her safely of a large, healthy baby. She made a perfect and uncomplicated recovery. I should be exceedingly loath to discard the dilators from my armamentariun, and can only attribute serious accidents following their use to a wrong diagnosis or a faulty use of the instrument.

Intra-uterine Medication.—There is undoubtedly a limited field for the application of drugs to the uterine cavity. It should not be forgotten, however, that it is often only supplementary to other treatment. It is just as rational to expect results from local applications to the uterine mucous membrane, as from applications to the mucous membrane of the nose and throat. The fault here is much the same as in other minor operations—either a wrong diagnosis is made, and local applications are used to the exclusion of other and probably better methods of treatment, or they have been injudiciously and rudely applied. Certainly in chronic endometritis we may expect some good from them, especially after the application of the curette.

The Curette.—This instrument, in properly selected cases, is invaluable. In my own hands the dull curette has proven worthless, and I much prefer a sharp one. Of course the instrument is capable of harm, but so is every other that is used in surgery. If even ordinary precautions are taken in selecting cases and manipulating the curette, no damage will follow its application. For affections of the endometrium following labor, or of a fungoid character, it is exceedingly useful; I know of nothing which will take its place. In removal of retained clots, etc., in the puerperium, the finger will be found to be more certain.

Operations on the Cervix.—The splitting up of the cervix for dysmenorrhœa and sterility has fallen into deserved disuse; all that can be accomplished in that direction can be done with the dilators.

Emmet's operation for the closure of lacerated cervix should meet much the same fate, at least in the vast majority of cases. The only excuse for the number of such operations which are being continually performed is a fear of subsequent cancer. A simple, uncomplicated cervical tear causes no more trouble or inconvenience to the patient than does a woman's ear which has been torn through by her earring. The ear would be repaired for cosmetic effects; the cervix is hidden from view, and that factor would not come into consideration. Most women have lacerations of the cervix of more or less degree. If the lips are thickened, everted, and eroded, they will need treatment. Oftentimes simple scarification, followed by the application of iodine and glycerin tampons, will reduce this condition and leave a clean, healthy tear—one which will remain so until the end of time. If the lips cannot be brought into a healthy condition, or if the uterus is subinvoluted and the endometrium diseased, the case may resolve itself into an operative one; but even here a trial with electricity will often disappoint the surgeon. In my practice it is rare to see a lacerated cervix which calls for surgical repair. Cases which come to me from other men, who have advised an operation, get well without it. Oftentimes the symptoms for which the operation was proposed were found to be due, not to the torn cervix at all, but to other troubles, principally constitutional.

It is the easiest thing in the world to re-light a pelvic inflammation whilst repairing a cervix, and I have seen this result follow such practice only too often.

Taking it all in all, I decidedly approve of minor uterine surgery in the field to which it is applicable, but it must be borne in mind that this field is a limited one, and one which becomes more and more narrow as our diagnostic resources increase.

CERVICAL ADENITIS.

BY BENJAMIN T. SHIMWELL, M.D.,
DEMONSTRATOR OF SURGERY IN THE MEDICO-CHIRURGICAL COLLEGE, PHILADELPHIA, PA.

THE occurrence of this condition in children, with its consequent results, is of such frequency that it is necessarily a matter of no little import.

The consideration of this subject will be confined principally to the treatment of the disease, especially the surgical means to be employed. The endeavor will be made to prove the advantage obtained from the radical treatment. This is based on an experience of many cases, which have proven the value of positive work, aided by definite aseptic rules. Close adherence to antiseptic principles has enabled us to place this treatment on a secure footing.

The annoyance and anxiety caused by a suppurating cervical gland have given way to a certainty of results, with less labor and loss of vitality. The suppurating scrofulous neck has been converted into a simple abscess which is easy of treatment.

It is not in the province of this paper to discuss the germ development as a factor in this condition, but it accepts the fact that it is proven; neither is it requisite to discuss the question whether the cocci have been excreted from the blood, or whether they have spread from the mouth along the salivary ducts.

There is a class of cases that have been placed in the category of scrofulosis, though I am not prepared to accept as positive evidence the wholesale classification under this head. While I must admit it in part, I argue from the basis, so claimed by its advocates, that this condition does arise in those of low vitality.

Let us examine into the physical state of children of tender age. How many are there who are up to the standard? Lack of care or proper feeding and attention at an age when this is most required has a positive tendency to produce this condition independent of any family history.

Lymphatic stasis, at this age, is the rule, not the exception. The examination of the neck in children, especially between the ages of two and ten years, shows marked glandular engorgement.

This form of adenitis is a local manifestation of a constitutional vice. It is more apt to be chronic in character, yet at times it takes on acute action which results in destruction, not only of the glandular, but also of the cellular structure. There may be only enlargement of the gland with suppuration of surrounding cellular tissue.

The peculiarity of scrofulous adenitis is its tendency to caseation; but in the neck it is more apt to result in softening, forming a whitish, whey-like fluid, holding a curd-like detritus. Yet it is not scientific to place in this list every case of caseation, for it is beyond doubt that this condition does occur in poorly-nourished children who show no history of scrofula.

Enlargement of the cervical glands frequently takes place in comparatively healthy children, in whom there is no cachexia. This is always charged to exposure in change of temperature, producing suppression of cutaneous perspiration, with glandular engorgement as a sequel. This is not a scientific explanation of the cause, yet in the absence of any known factor it is generally accepted.

Septic adenitis is due to absorption of septic products from the fauces, as they occur in scarlet fever, diphtheria, tonsillitis, and aphthous affections. We find at times that the tumefaction of the glandular structure may extend beyond the simple inflammatory into the suppurative stage, yet it is surprising to what an extent suppuration may take place in the surrounding cellular tissue without any breaking down of the gland structure proper.

The amount and location of the deposit generally governs the glandular involvement. When pillars and fauces are involved, then marked engorgement is apt to be present. It is less likely to occur when the tonsils alone are involved. Yet we see many cases of extensive faucial complication with little gland trouble.

The importance of early operation is not appreciated, especially in the acute or septic abscess, until the anatomical arrangement of the deep cervical fascia is understood.

While the arrangement of this fascia limits the direction of the abscess, it is not to be supposed that every case of suppuration follows its course, for it is evident to us all at times that the inflammatory action may be such that the continuity of these spaces is limited and the abscess circumscribed. Still again, how often have we seen a violence of action so great that there seemed to be no limit to its course?

The superficial fascia has no import in this disease.

The deep fascia is a dense membrane arising from the seventh cervical vertebra and the ligamentum nuchæ, and passes forward across the neck until it reaches the posterior border of the sterno-cleido-mastoid muscle; it there divides into an anterior and posterior leaflet. The anterior leaflet passes over the anterior part of the muscle to unite with the opposite side, and then passes upward, covering the masseter muscle and parotid gland, making the masseteric and parotid fascias, and thence passes down to the clavicle and sternum. This superficial layer is strong enough generally to prevent the progress of abscesses to the surface and would compel or encourage them to take deeper positions. The posterior leaflet passes behind the sterno-mastoid to unite with the anterior leaflet at the anterior border of the muscle. It then gives off a process which passes behind the hyoid depressors, invests the thyroid body and front of the trachea, and passes down in front of that tube and the large vessels to the fibrous layer of the pericardium. It also gives off a layer—the pre-vertebral layer—which passes behind the pharnyx and gullet and descends into the thorax behind the œsophagus. The sheath of the carotid artery, jugular vein and pneumogastric nerve is made by processes from the posterior leaflet and the pre-vertebral layer.

Henke, by injecting gelatin into the interspaces of the cervical region demonstrated their relations, as follows:

"*1. The capsule of the submaxillary gland.* It forms a completely closed envelope to the gland, from which continuations extend to the deep and superficial fascias.

"*2. Peri-visceral interspace.* The connective-tissue planes or interspaces situated between the pharyngeal group of laryngeal muscles (hyo-thyroid, sterno-hyoid, and sterno-thyroid) anteriorly, and the larynx, thyroid gland, and trachea posteriorly. It communicates with the anterior mediastinum. Perforation of a suppurating thyroid gland leads to invasion of this space, with subsequent compression of the trachea.

"*3. Retro-visceral interspace.* The interspace between the larynx and œsophagus in front and the vertebral column behind. It communicates with the posterior mediastinum.

"*4. Peri-vascular interspace.* This interspace contains the carotid artery and jugular vein. It communicates with the anterior mediastinum along the course of the large vessels, and is important on account of the frequent suppuration of the group of lymphatic glands situated in front of, and external to, the jugular vein. Abscesses of this space displace the sterno-mastoid muscle outwardly; they extend along the vessels downward, and, if left to themselves, either perforate the deep and superficial fascias and the skin near the clavicle, between the lower end of the sterno-mastoid muscle and the trachea, or make their way along the vessels into the anterior mediastinum.

"*5. Intermuscular space.* An interspace situated at their crossing between the lower third of the sterno-mastoid and omo-hyoid muscles. This space owes its origin to the sliding of the contiguous muscles upon each other, and is limited posteriorly by the scaleni. It contains a group of lymphatic glands situated near the posterior edge of the lower third of the sterno-mastoid muscle (supra-clavicular glands), and communicates inward with the retro-visceral space, and along the subclavicular vessels with the axillary cavity. Supra-clavicular abscesses usually extend into the armpit."

These experiments show the course that abscesses are liable to take. The difficulty in treating is to secure proper drainage.

Simple glandular inflammation does not require any special discussion. Special septic or non-septic inflammations must by their gravity call for knowledge of cause and effect.

External manifestation is no evidence of trouble more deeply seated. An engorgement of the cervical region, with all the evidence of superficial inflammation, will often, on incision and exploration, show that the location of the pus sac is deep in the tissues of the neck, extending in some cases to the retro-visceral space. These are the cases where injudicious applications would give serious results. It can readily be seen how destruction would take place in this location before softening and sloughing of tissue would go on sufficiently to give external manifestation.

The treatment is modified by the cause. It is promotive and radical.

In those cases that come under the head of scrofulosis, the preventive treatment is not one of easy management. The outline of treatment for this affection is too well known to need discussion. It should be obligatory upon us to so look over the children of our *clientèle* as to place them in such a condition that will, if it does not entirely avert, at least modify any outburst.

Too little attention is given to the growing child unless it is positively ill. Its food, hygiene, exercise, schooling, should all be the physician's care. The pinched face, thin neck full of enlarged glands, skinny legs, and tumid belly should be changed. By doing this in time of seeming health many after-ills might be prevented.

In the septic form the preventive treatment is more positive. To prevent the absorption of septic material from the throat is the object. This is met by means that will get rid of the deposit and prevent its absorption. There is one thing to be avoided, and that is anything that will tend to lower the patient's vitality. Stimulate for effect. Give food in sufficient quantities. Keep the emunctories free. If these fail, septic infection takes place. This brings us to the surgical consideration of the disease.

It is at this place I wish to enter my protest against the use of poultices. I have been forced to this conclusion, not only by scientific considerations, but by actual experience. I am emphatic when I say that the day of poultices has gone by. I wish to lay stress on this, for, the moment glandular enlargement appears, the patient is swathed in hot flaxseed, repeated *ad infinitum*. I must admit it is true that heat favors relaxation in the beginning congestive stage. I deny its efficacy when it gets beyond that point.

The scientific interest in the disease lies in the question, Which has the more vitality, the cocci or the phagocyte? After the inflammatory stage has set in, heat and moisture only tend to soften and lower the vitality of the tissue and increase the vitality of the cocci, thereby increasing their development with conseqent destruction.

It has been my experience that after glandular inflammation has been fully reached, all things being equal, suppuration is always present. Still, inflammation may be present and the general condition be well maintained or improved; then, possibly, suppuration does not occur. When we see the engorgement persisting or increasing, and the general condition not maintained or decreasing, then pus is of necessity present. If the latter, and the pus be not interfered with, your patient dies as much from septicæmia as from the primary disease.

What, then, is the treatment? A clean pair of hands and a clean knife.

In the beginning of septic infection warm applications may (?) favor relaxation. Massage of the parts and absorbents in lanolin give, at times, good results. Keep up the systemic treatment;

stimulate for effect; the nearer the patient gets to the normal condition the less the chance for infection. If this treatment does not abate the condition, then radical measures must be taken.

The first step in the operation is the preparation of the patient, for to be successful thorough antiseptic precautions must be taken. The neck is to be well scrubbed, then washed with ether or alcohol, and afterward with bichloride solution, 1 to 1000. Every particle of dirt must be removed. If time allows, the neck should be wrapped in bichloride towels. The child is etherized and placed on the table in a good light, the head being so arranged that the suppurating side is made as prominent as possible.

The anatomical relation of parts must be carefully noted and the location of the adenitis outlined. The direction of the line of incision is made to take advantage of the platysma myoides muscle; by this we secure perfect dilation of the superficial wound.

I have always followed the method suggested by Hilton in opening abscesses in important regions. The skin and superficial fascia are incised; the knife is then laid aside and the grooved director used; the deeper layers are then torn asunder until the pus sac is found. The director is thrust through it, which is known by escape of pus. Having done this, a pair of strong narrow-blade dressing or bone-forceps is inserted through the opening; having entered the sac this is then opened and drawn out with the blades apart; this tears the sac and superimposed tissues, allowing free exit to the pus. The well-asepticized finger is then introduced to find the extent and character of the cavity. All loculi are broken down to make the cavity one. This done, the sac is well irrigated, and this is carried on until every particle is washed out. If the irrigant has returned clear and then shows even the slightest amount of pus, the finger must be re-introduced to discover the source of its exit. This is important, for it is a sign that complete evacuation has not taken place. It is a reason why recovery is at times slow; the condition has not been entirely removed.

The drainage is governed by the location, size, and character of the cavity. Make a counter-opening, if necessary. Use rubber drains if the sac is situated deeply and is of considerable size; catgut if more superficial and smaller. Iodoform is used, bearing in mind the idiosyncrasy to it in children. Bichloride gauze in large, well-crumpled masses is applied; no compresses are to be used; all the dressing is to be held in place by bandage. This is the method in simple phlegmon.

When gland destruction is present it requires more care; the same method of incision is used; the broken-down gland is removed by the finger, knife, or curette, and its removal must be thorough. The finger is a very useful and safe instrument. Careful exploration with the finger is to be instituted. Here the rubber drain *must* be used. If the cavity remaining be superficial, careful packing with iodoform gauze is advisable, being sure to get the gauze in contact with every part of the wound.

The changing of the first dressing is to be governed by the discharge. The rubber drain is removed as soon as possible and catgut substituted if necessary. A cervical phlegmon, with non-removal of glands, should get well under three dressings.

Bichloride solutions should never be used, unless they be well washed out with some other antiseptic.

I have found silico-fluoride of soda, half a grain to the ounce, an excellent non-toxic antiseptic. Thursch's boro-salicylic acid solution has also given me good results.

Under this method we find that pain and fever abate at once, with lessening of all other symptoms.

In conclusion, there is one thing to which I would call attention in operations in this region, and that is shock. This is entirely out of all proportion to the amount of interference. Therefore, it is necessary that you should be sure of the ability of your ether-giver.

MALIGNANT DISEASES OF THE DEEP LYMPHATICS OF THE NECK.

BY OTTO JUETTNER, A.M., S.M., M.D.,
OF CINCINNATI, OHIO.

THE neck is a region of the greatest anatomical and surgical interest, because of the intricate and intimate aggregation of the vital structures which it contains. The following history is given on account of the many interesting features which the case presented from the time it came under observation until the patient was discharged.

In the beginning of this year, Christian H., aged fifty-six years, was referred to me by one of my professional friends on account of very distressing dyspnœa. The patient was robust in appearance, and, according to his own statement, had always been in perfect health. His family had shown, for several generations, a strong tendency to malignant disease. Six or seven months before consulting me the patient began to complain of soreness in the right side of his neck. Pressure over the line of the carotid artery produced sharp pain. In a short time a well-marked indurated growth appeared in this region. The tumor gradually became more and more pronounced, and within six months after the first appearance of local symptoms grew into a hard, immovable, uniform mass, extending in the line of the cardia from the lower jaw to the clavicle. The growth was about the size of a moderately large cocoanut, and was unyielding, and could neither be lifted from its bed nor be shifted from side to side. Dysphagia finally became so great that swallowing even liquid food was performed with some

difficulty. As the result of pressure by the tumor upon important nerve-trunks incipient motor paralysis and paræsthesia of the right arm appeared, and there was very distressing dyspnœa. In the face of all these symptoms, and the gradual reduction of the patient's strength and weight, the malignancy of the growth seemed evident, and this diagnosis was subsequently confirmed by a microscopic examination of the tumor.

The question of giving the man relief by operative procedure resolved itself into the choice between removal of the tumor or tracheotomy. Extirpation of the growth, although a much more difficult and dangerous operation, offered not only relief of the dyspnœa, but also a chance of recovery, while tracheotomy could only give temporary relief. When the nature of the two operations was explained to the patient he immediately decided in favor of the radical operation.

The operation for the removal of the growth was performed at the Good Samaritan Hospital, January 23, in the presence of Drs. Orr, Juettner, Sr., Beckler, and Walker. An incision extending down to the tumor was made from a point midway between the angle of the lower jaw and the mastoid process to a point about one inch above the junction of the outer and middle thirds of the clavicle. The superficial cervical fascia, the platysma, the deep fascia and part of the sterno-mastoid and trapezius muscles were divided. A dense network of fibrous bands surrounded the tumor, and bound it firmly to the contiguous structures, particularly to the inferior maxillary bone. By means of the handle of the scalpel and my index finger the growth was slowly isolated. Its deep attachments were intimately blended with the carotid sheath and the chain of lymphatics accompanying the carotid artery. Upon lifting the tumor from its socket the interior of the cavity presented an anatomical and pathological condition of unusual interest. The common carotid, exposed for a distance of at least a half-inch, could be seen pulsating violently. Five or six enlarged glands, about the size of hazel-nuts, lay in contact with the arterial sheath, arranged like peas in a pod. A meshwork of nerves, arteries, and veins covered the greater portion of the interior of the cavity. The muscles of the affected region had slowly yielded to the pressure exerted by the neoplasm and had become atrophied. The omo-hyoid, for instance, could be traced as a delicate fibrous band, emerging from the submaxillary triangle, and lay loosely among the other abnormally located and altered structures.

After the removal of the enlarged glands the cavity was carefully cleansed and packed with sublimated gauze, and the patient was returned to his room. In connection with the after-treatment I cannot extol too highly the excellence of peroxide of hydrogen as an antiseptic agent. The patient reacted satisfactorily, and left the Good Samaritan Hospital eight days after the operation, with a healthy and rapidly granulating wound.

The intricate and close arrangements of important bloodvessels, with the corresponding danger of hæmorrhage, during and after operation, makes the neck a kind of surgical *noli me tangere*. But the amount of blood lost is not always in proportion to the extent of operation. It is this feature which makes the foregoing case worthy of notice. In spite of the fact that the operation was a veritable dissection of the right side of the neck, the quantity of blood lost did not amount to one ounce. The extent of hæmorrhage accompanying or following operations on the neck depends in no small degree upon the care taken in examining parts before dividing them. In all operations in the cervical region the rule should be *festina lente*.

Malignant disease of the deep lymphatics of the neck is always serious. The clinical history of most cases is one of intense pain. In its incipiency the symptoms of malignant disease of the deep lymphatics are obscure, or they may be absent. When the case has progressed to a point when the diagnosis can be made, the prognosis is hopeless. Aside from the fatal termination of these cases *per se*, there is danger of serious hæmorrhage caused by ulceration of bloodvessels contiguous to the tumor. In the non-ulcerative malignant tumors of the neck, the only mode of treatment worthy of mention is complete extirpation of the growth, which, however, is by no means a trifling operation, and must be carefully weighed in the mind of the surgeon before being decided upon. Postponement of the inevitable end by means of an operation is justifiable in certain cases. If the patient survives the operation he may enjoy a short period of freedom from pain. Within a few weeks or months the disease will return, however, with renewed malignancy. This is the uniform history of these cases. In the foregoing case there is as yet, five weeks after the operation, no signs of recurrence. The patient has unobstructed respiration, and his weight has not decreased since the operation. The questions of vital interest are, How long will this so-called recovery last, and, Is the operation justifiable in the face of certain recurrence? The change in the condition of my patient, from one of indescribable agony to one of ease and comfort, speaks volumes in favor of the operation.

EXCISION OF SPINA BIFIDA.

BY IRA K. GARDNER, M.D.,
OF NEW HAMPTON, IOWA.

SPINA BIFIDA is one of the most serious malformations which we are called upon to treat in infantile life.

I desire to make this article brief, and consequently will not discuss the pathology, diagnosis, or prognosis of spina bifida, but will describe its treatment at once, as illustrated by a case which

came under my care. The treatment of this congenital malformation is divided into two classes—palliative and curative.

The protection of the tumor with a soft, hollow truss, and the application of a simple cerate or collodion to the skin, if it is thin or seems likely to ulcerate, are sufficient to fulfil the first indication.

The curative plan of treatment is usually by puncture, injection, ligation, or excision. I treated my case by puncture and excision.

On May 24, 1886, my partner, Dr. H. M. Mixer, and I, were requested to examine a female child, two months of age, with a congenital tumor about the size of a hen's egg, situated on its back in the lumbar region. Upon examination it was promptly diagnosed as spina bifida. The skin was normal in appearance over the surface of the tumor, except near the apex, where it was thin and of a dusky color. The tumor was sessile. The child was well nourished. There was neither hydrocephalus, paraplegia, nor paralysis of sphincter muscles, and there had never been any convulsions. There was a simple talipes equinus. Dr. Mixer and I punctured the tumor with a medium-sized aspirating needle, and a few drachms of a light-colored fluid of a slightly alkaline reaction were withdrawn. No symptoms of collapse or convulsions followed. After four days the parents returned with the child. The tumor had again filled with the fluid. It was evacuated of its fluid at this time, and again on May 30th, June 8th and 18th, but refilled after each operation. The child continued to thrive and there was no decrease in the size of the tumor. The patient was not seen again until January 15, 1887, when nearly two ounces of fluid were withdrawn.

Nothing more was seen of the case until April 12th of this year. The child was now fourteen months old. Its general health was good. The tumor had increased considerably in size and measured nine and a half inches in circumference and was still sessile.

The operation of excision was now considered. The many failures and few successes attending this operation were stated to the parents. After thinking the matter over they decided to have the operation performed, which was somewhat reluctantly consented to on our part. The operation for its removal was performed April 15th. An anæsthetic was administered and a curved incision extending through the skin and sac was made on one side of the tumor near its base.

Dr. Mixer and I decided before beginning the operation to abandon it if the spinal cord occupied any part of the sac or if it contained any large nerves. On inspecting the interior of the tumor through the opening in the sac, it was found to be free from these important structures. The cleft in the vertebræ was quite small. A band of connective tissue passed from the apex of the tumor to its base. The operation was completed by making an incision similar to the first on the other side of the tumor. The elliptical opening in the skin was closed by interrupted silk sutures. The incision was so made that the edges of the wound were in exact coaptation, and would, after removal of the tumor, probably have remained so without the use of sutures. The sac was adherent to the skin and cellular tissue. A few adhesive straps were applied to prevent tension upon the sutures, and the dressing was completed by the application of a large compress of carbolized absorbent cotton, secured in position by a broad bandage around the body. A mixture of bromide of potassium and chloral was given to guard against a possible attack of convulsions. Twenty-four hours after the operation the child looked as well as it ever did. Every function seemed to be performed perfectly and continued so for forty-eight hours. Seventy-two hours after the operation it was noticed that a peculiar pallor had spread over the child's face, it refused to nurse, seemed restless, although apparently suffering no pain, and died soon afterward. The wound had almost completely united by first intention. Large quantities of cerebro-spinal fluid issued continually from the wound. A large compress or pad of absorbent cotton would be completely saturated in a few minutes. Indeed, while changing the dressing the fluid could be seen trickling from the wound.

Were we justified in performing the operation of excision? Let us see what some of the authorities say:

Holmes,[1] after speaking of the several methods of treating spina bifida, says: "There remains the operation of excising the sac. As several cases of successful excision are on record, it would, I think, be rash to proscribe the operation in a disease so fatal as spina bifida."

On page 841 of the same volume the indications for operative interference are succinctly stated as follows: "If the tumor can be tapped and the fluid drawn off without producing nervous symptoms; if there is no increased sensibility in the usual place of attachment of the cord; if the disease, though increasing, is not attended by convulsions; if the tumor is equable in transparency and consistence throughout; if, on tapping the tumor, the trocar can be passed into the centre of the sac without appearing to set up such symptoms as we expect from touching the cord—we may fairly act on the assumption that the cord is absent. In cases where it is suspected that the cord is present, no treatment should be adopted, except in express deference to the wishes of the child's parents and with a full knowledge on their part of the probability of a fatal result."

Our case was almost identical with the foregoing description. Again, on the same page, the author continues: "When the tumor refills as fast as it is emptied by the trocar, some other method must be

[1] Holmes's System of Surgery, vol. iii. page 842.

practised if the child's life is to be saved." This was true in our case. After each tapping the sac was speedily refilled.

Gross,[1] in speaking of the operation of ligation and excision, says: "Such procedures cannot be too pointedly condemned as being unscientific and certain to prove fatal."

We find this statement in the *International Encyclopædia of Surgery*,[2] in regard to the operation of excision of spina bifida: "The *modus operandi* is of little moment. If the sac contains cord elements the result will prove fatal; if not, success may possibly follow."

What caused the death of the child? It was neither due to shock nor to inflammation of the membranes of the cord. Was the loss of so large an amount of cerebro-spinal fluid, which plays an important part in the animal economy, a sufficient drain on the system to cause the fatal termination?

Gray[3] thus speaks of it: "The cerebro-spinal fluid fills up the subarachnoid space. It varies in quantity, being most abundant in old persons, and is quickly reproduced. Its chief use is probably to afford mechanical protection to the nervous centres and to prevent the effects of concussions communicated from without."

Ranney[4] says: "The functions of this fluid are to equalize the pressure within the brain, when the amount of blood in that organ suffers variation, as in the respiratory act."

The first day or two after the operation, while success seemed probable, I decided to report the case. After the operation proved a failure I almost decided not to report it; but after considering all the features of the case, it occurred to me that our failures are sometimes nearly as instructive as our successes. I have as yet been unable to find statistics giving the mortality of this operation.

I operated upon this case because the parents of the child had become tired of palliative treatment and desired to have a curative measure adopted. I consented to report this case because of the frequency of this congenital defect and the dearth of literature upon the subject.

[1] Gross's System of Surgery, vol. ii. page 212.
[2] Vol. iv. page 900. [3] Gray's Anatomy.
[4] Medical Anatomy, page 222.

THE PATHOLOGICAL ANATOMY OF TIC DOULOUREUX.

BY CHARLES L. DANA, M.D.,
PROFESSOR OF NERVOUS DISEASES IN THE N. Y. POST-GRADUATE MEDICAL SCHOOL, AND IN DARTMOUTH MEDICAL COLLEGE.

INVETERATE trigeminal neuralgia has been caused by local disease, such as a bony tumor, or aneurism, or syphilitic exudation.

The ordinary cases of tic douloureux, however, occurring after middle life, affecting usually and chiefly the second branch of the trigeminus, are not due to such causes. Little is known of its pathological anatomy, it being generally believed that there is no especial change in the nerve or its centres, and that the disease is a neurosis.

Anstie was of the opinion that this, like other chronic neuralgias, was due to an atrophic change in the sensory ganglia. Dr. de Schweinitz has reported one case, in which he found evidence of some degenerative inflammation in the nerve.[1]

Recently the Gasserian ganglion removed in a case of tic, was found to show evidence of degenerative atrophy.

But it may be stated confidently that neuritis and degenerative changes in the nerve are not the usual and ordinary conditions in tic douloureux, for in almost all cases, no matter how old, no permanent anæsthesia occurs. On the other hand, in cases of progressive trigeminal anæsthesia due to degenerative neuritis which I have seen, there is little pain. Nor should we expect a slow parenchymatous degeneration to cause great sensory disturbance.

The question arises, therefore, whether there is any tangible cause of the condition.

My proposition is, that many cases at least are due to an obliterating arteritis of the nutrient vessels of the nerves. My reasons for this are these:

1. The disease occurs at a time of life when degenerative changes in the arteries begin.

2. It affects chiefly and primarily a nerve supplied by one of the terminal branches of the internal maxillary, itself a branch of the external carotid. If it extends, or recurs, it involves a nerve nourished by the inferior dental, also a branch of the external carotid. It rarely affects seriously the supra-orbital nerve, which is supplied by a branch of the internal carotid. Hence the disease follows a certain fixed vascular distribution.

3. I have examined five superior maxillary nerves removed in typical cases of tic douloureux. In none was there any noteworthy change in the nerves.

In three of them striking evidence of arterial disease was found. In the fourth and fifth cases no bloodvessel was present in the specimens.

4. The view that an obliterating arteritis is a factor in this disease is strengthened by therapeutic experience. Nitroglycerin will sometimes relieve pains instantly, and for a long period of time. Aconite, which is so useful in this disease, also lowers blood-tension; while potassium iodide, which sometimes favorably modifies the arterial disease, is occasionally useful in tic.

5. There is unquestionable evidence that removal of the peripheral nerves sometimes cures tic en-

[1] THE MEDICAL NEWS, July 19, 1884.

tirely, and hence that the disease is peripheral, and due to some local peripheral irritation.

6. MM. Quenan and Lepars have recently stated that by a new method of injection they have been able to discover a closer and more extensive relationship between the nerve-trunks and bloodvessels than has heretofore been known, and they suggest in their conclusion that disturbances in blood-supply may be a serious factor in causing neuralgia. The details of their paper are not yet accessible.

My argument stands in this position, therefore:

I adduce positive facts that the trigeminus and its roots, and even nuclei and deep roots, are not diseased, even in old and typical cases.

In all cases where the *vessels* were examined striking disease was found to be present.

Circumstantial evidence is furnished by therapeutic experiment, and by the general etiology and anatomical distribution of the vessels and of the pains.

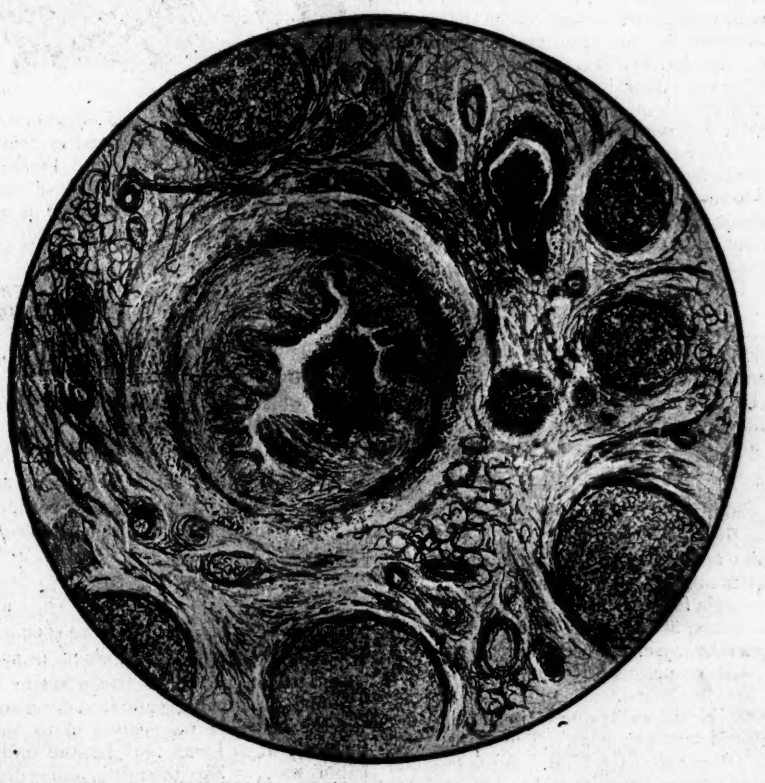
My argument is necessarily deficient in numbers of cases. If someone finds a superior maxillary nerve, from a case of tic, with a perfectly healthy infra-orbital artery, the case would be weakened.

I believe, however, that such a case, if it occurred, would be of an unusual type.

At present it seems to me that it would be pretty safe for me to assert that a good many of the typical cases of tic douloureux occurring after middle life (and almost all such cases do occur then) are due to an obliterating arteritis of an infra-orbital or inferior dental artery (terminal branches of the external carotid), plus some peculiar vulnerability of the central venous system.

The experience of surgeons in treating tic douloureux by ligaturing the common carotid, shows that pain in the inferior dental branch is affected favorably by this operation, pain in the superior maxillary is affected very little, and pain in the infra-orbital not at all. Possibly ligature of the external carotid may be all that is indicated surgically, for this artery supplies the second and third branches of the trigeminus. I would not expect ligature of the internal carotid to do any good.

FIG. 1.



The argument is defective in that I have not examined the infra-orbital arteries of healthy persons of from forty to sixty years of age. But this is not much of a defect, for the reason that with obliterating arteritis there must, I would admit, be some specific vulnerability of the nerve-centres.

The following is a summary of my cases:

CASE I.—Male, aged sixty-five years, a gardener; a patient of Dr. Robert Abbe's, to whom I am indebted for the nerve. The disease had lasted for four years; no alcoholic or syphilitic history. Pain involved the right superior maxillary nerve, especially the dental and infra-orbital branches.

The nerve was removed two years ago along with the infra-orbital artery as far back as the spheno-maxillary fossa, with the result of curing the case. The central end of the removed nerve was examined by me microscopically. The nerve-fibres were found but slightly affected. The artery, however, showed an extraordinary degree of inflammatory thickening (see Fig. 1). The muscular coat seems unusually thick, as though there was hypertrophy of the muscular fibre. There is a great deal of connective-tissue proliferation and thickening of the external coat. The intima also shows degenerative changes in its cellular constituents.

CASE II.—Michael D. (case of the late Dr. James K. Wood, reported by Dr. Dennis). Disease had lasted five years; no history of alcoholism or syphilis. Pain located in the left superior maxillary nerve. Nerve removed in 1873. Pain recurred in inferior maxillary. Death from opium habit, in 1877. Examination of the intra-cranial portion of the trigeminus by Dr. William Welch showed no evidence of disease, either in the nerve-root or in its nucleus or deep origin. On examination of the superior maxillary nerve by myself, there was found a great deal of fatty tissue about the fibres, and in this are *diseased bloodvessels*.

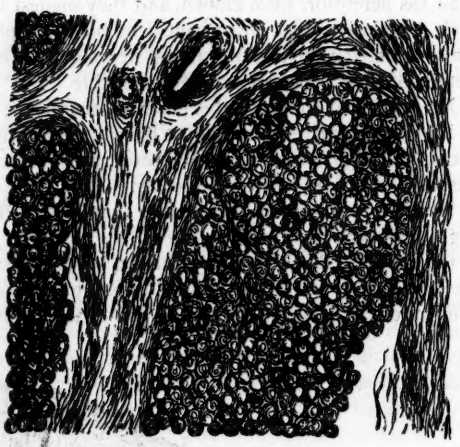
The nerve-fibres have undergone complete degeneration, and appear as broken, swollen tubes of myelin without a trace of axis-cylinders. The change is probably a post-mortem one, however, as the nerve has been kept in alcohol for nearly twenty years.

CASE III.—Emma B. (case of Dr. Wood's, reported by Dr. Dennis). Disease had lasted several years (no details given). Superior maxillary nerve removed by Dr. Wood. Recurrence of pains in the inferior maxillary nine months later. Examination of nerve by myself. No bloodvessel in field. The nerve shows nothing but a slight increase in its connective-tissue support. A few fibres have apparently undergone degeneration.

CASE IV.—Joseph J. (case of Dr. Wood, reported by Dr. Dennis), aged forty-two years; no history of syphilis or alcoholism. Has had malaria. Supra-maxillary neuralgia for several years. Operation and cure (for two years, at least). The supra-maxillary nerve, examined by myself, showed increase of interstitial tissue, with numerous tortuous capillaries in it whose walls are thickened. Small arterial vessels, with greatly thickened walls, due to increase of external and also of muscular coat. The intima also shows disease atheromatous in kind. Nerve fasciculi showed a slight increase in peri- and endo-neurium; occasionally a Deiter's cell among the fibres. Nerve-fibres not affected.

CASE V.—William S. R. T., male, aged fifty years, from Scotland, telegraph operator. Family history of tic douloureux. Had suffered from malaria, but not from syphilis. Not intemperate. Infra-orbital neuralgia for ten years. Had tried drugs of all kinds, and had had two operations at infra-orbital foramen. Operation by Prof. James K. Wood, in 1873. Patient was free from pain in 1876. The examination of the nerve by myself

FIG. 2.



showed a slight degree of degeneration of nerve-fibres. The picture presented is a good deal like that figured by Drs. Mears and De Schweinitz[1] in a section of the inferior dental nerve removed for trigeminal neuralgia. The change is not nearly so marked, however, and may be in part post-mortem.

TWO CASES OF CEPHALIC VERSION IN SHOULDER PRESENTATION.

BY C. S. HOFFMAN, M.D.,
OF KEYSER, WEST VIRGINIA.

MY object in publishing these cases is not on account of the mal-presentation of the children, but on account of the ease by which the cases were transformed into head presentations and delivered.

The first case I made no record of, but I distinctly remember the circumstances, although it occurred a few years ago.

A lady who was the mother of two well-developed children, and who had had easy labors previously, was taken in confinement at 4 o'clock in the morning, when she sent for a midwife whom she had engaged to attend her. The midwife arrived a few minutes after being called, and remained with her all the time. I was called in to see the case at 1 P.M., when I was told by the midwife that the labor was, as she thought, proceeding naturally, but very slowly for the amount of pain the woman was having. At about noon the waters broke, and what was thought to be the foot of a child appeared. Concluding something must be wrong, she had sent for me. The woman had now been in labor nine

[1] THE MEDICAL NEWS, July 19, 1884.

hours, during which time the waters had ruptured, while the foot of the child had been protruding for about one hour. On making an examination I found the left arm of the child protruding from the vulva; the left shoulder well down below the brim of the pelvis; the head in the right iliac fossa. The woman's pelvis was roomy, and the os well dilated. The pains were very strong, especially when I made any attempt to change the position of the child. I at once administered chloroform, and while the midwife continued its administration I folded the forearm of the child upon the arm and easily returned it into the womb. I then passed my hand over its head, and brought this down to the brim of the pelvis, converting the presentation of the child into a vertex presentation of second position. I then applied forceps to the head, and in less than ten minutes from the time my patient was fully under chloroform the head was well down in the pelvis. The balance of the delivery was easy and natural. The child was above the average in size, and as vigorous as could be desired.

My other case occurred a few days ago:

A negress, about twenty-five to thirty years of age, short and very stoutly built, and the mother of three children, all of whom were born alive, though she says her labors have always been tedious and hard. This time she was taken in labor Saturday evening, February 7th, it being the full period of her gestation. She was in active labor all Saturday night and all day Sunday. Sunday evening at about 7 P. M. she noticed something protruding from her vulva, which she discovered to be the arm of the child. The labor continued all Sunday night, and on Monday morning her husband came for me, telling me the history of the case as related. As she lived some distance from town, and not knowing what assistance might be required, I asked Dr. Workman to accompany me. We were unable to get to the woman until about 11 A. M., February 9th, making the period during which she had been in labor over forty hours. We found, as had been represented, an arm protruding. A loop of the umbilical cord was down in the vagina, œdematous and non-pulsating. The right arm and right shoulder were impacted well down in the pelvis. The head was in the right iliac fossa. The child was dead. The woman's pelvis was as roomy as could be expected in a short, stout person. The os was well dilated. The amniotic fluid was well drained off, and the womb tightly contracted. The woman was considerably exhausted. We gave her a couple of ounces of whiskey, and then Dr. Workman administered chloroform. Considering the long time the woman had been in labor, and the tightly contracted condition of the womb, it was a difficult undertaking to turn and deliver by the feet.

Remembering my experience with the case I have just related, I determined first to try to return the arm into the womb, by grasping the head, and bringing it down to a head presentation. Failing in this, I determined next to try to turn and deliver by the feet. If this should fail I had no other resort but embryotomy. As soon as she was fully under chloroform I folded the forearm of the child upon its arm, and then by steady but careful pressure and manipulation succeeded in slightly elevating the shoulder and carrying the arm into the womb. I then passed my hand up over the head, and brought it down into the pelvis, at once applied my forceps, and delivered the woman. In less than three-quarters of an hour from the time we arrived at her house the woman was delivered. Ten days after, the husband told me his wife was well and out of bed.

I am satisfied from the manner in which the womb was contracted down on the child that to turn would have been a very difficult if not an impossible operation. The child was of average size.

It is surprising to me in these cases with what ease the head was rotated after the arm was returned. The ease by which these deliveries were accomlished is to be seen by the short time occupied in performing them.

ORIGINAL ADDRESS.

THE CAUSATION OF DIPHTHERIA.[1]

BY WILLIAM H. WELCH, M.D.,
PROFESSOR OF PATHOLOGY, JOHNS HOPKINS UNIVERSITY.

THE subject which I have selected for this address is so largely a topic of the day, and fills at present so much space in medical journals, that the main facts which will be here presented must appear familiar to those who have followed recent medical literature. Nevertheless, many of these facts are so new and so important, and the disease to which they relate is one of such great interest, that no apology is needed for bringing before you a brief summary of the recent investigations concerning the causation of diphtheria, and the light which these discoveries have shed upon our knowledge of the pathology, prophylaxis and treatment of a disease more dreaded, and justly so, than any other infectious disease always present among us. Although these new discoveries are mainly the results of bacteriological work, it will be my purpose to dwell not so much upon minute bacteriological descriptions, more suitable to the laboratory and to special articles than to a general address of this kind, but rather upon those points which illustrate the application of these discoveries to a fuller and more correct knowledge of the nature, etiology, pathology, diagnosis, prevention, and treatment of diphtheria.

The history of our knowledge of diphtheria illustrates the difficulties which we encounter in endeavoring to reach a full understanding of a disease upon the basis of its symptomatology and pathological anatomy alone. Consider for a moment what are some of the uncertain and still much disputed questions concerning this disease.

Is diphtheria primarily local or constitutional in its

[1] The annual address before the Medical and Chirurgical State Faculty of Maryland, at its ninety-third annual session, held in Baltimore, April, 1891.

origin? Are all pseudo-membranous inflammations of the throat, not directly referable to caustic irritants, diphtheria? Is there a purely local, non-contagious pseudo-membranous laryngitis called croup distinguishable from diphtheria? Are the pseudo-membranous anginas secondary to scarlatina, and less frequently to measles and some other infectious diseases identical with diphtheria? Is there any relation between follicular tonsillitis and diphtheria? May diphtheria occur in a mild form as a simple catarrhal inflammation of the throat? Are pneumonia, acute nephritis, suppuration of the glands in the neck, etc., referable to the direct action of the diphtheritic virus; in other words, what lesions belong to the disease and what are complications? Shall reliance be placed chiefly upon local or upon general treatment?

These are some of the questions which the most careful study of the clinical history and of the anatomy of diphtheria has not been able to answer clearly and unmistakably. Nor are these matters only of theoretical importance. Referring to the two doctrines of the local and of the constitutional nature of diphtheria, Dr. J. Lewis Smith, one of the most painstaking and profound investigators of this subject in this country, says: "It is a matter of great importance—an importance transcending that of almost any other subject relating to the pathology of this dreadful scourge—that we should ascertain clearly and certainly which of the two prevailing theories is true, since the theory influences practice."

I hope to be able to show in the course of this address that this question, as well as others mentioned, have now been answered "clearly and certainly," and that we are in a position to solve other of the problems still remaining in doubt. All of this gratifying widening and deepening of our knowledge has come from the discovery of the microscopic germ which is the specific cause of diphtheria, and from the study of the singular and interesting properties of this germ. There is, perhaps, no other disease, with the exception of tuberculosis, upon which greater light has been shed by the discovery of its specific cause than upon diphtheria.

Permit me to present to you, in the first place, the evidence that the so-called Klebs-Löffler bacillus is really the specific agent of infection in diphtheria; and then to describe the most important properties of this microorganism, so far as they bear upon the subject of this address.

There are three things especially which have rendered difficult the convincing demonstration that a given microörganism is the specific cause of diphtheria.

The first is the uncertainty as to what shall be called diphtheria, and the possibility that included under this name are various affections which may be due to different causes. Hence it might happen that one investigator studying one class of cases—for instance, the pseudo-membranous anginas associated with scarlet fever, measles, etc.—might obtain results different from another who observed another class of cases. In view of this uncertainty, it is clear that conclusions as to the causation of primary diphtheria should be derived from the investigation of cases which all are agreed in regarding as genuine primary diphtheria. When the etiology of this undoubted class of cases has been determined, we are in a position to examine whether the secondary and other doubtful forms of diphtheria have a different causation or not.

A second difficulty has been not in the demonstration of microörganisms in diphtheria, but rather in the abundance of bacteria present in diphtheritic membranes. Of the various species of bacteria found in the false membranes of diphtheria, we must determine which are constantly present and which are inconstant. If we find one species always present in large number and absent in other conditions, the presumption is that this is the specific cause of the disease, and this presumption becomes a certainty if we are able to reproduce experimentally, by inoculation with pure cultures of this germ, a disease in all respects identical with human diphtheria.

Just here we meet the third difficulty, which consists in bringing positive evidence that our experimental disease is in reality identical with human diphtheria. We are accustomed to regard the fibrinous pseudo-membrane on the mucous membrane of the tonsils, pharynx, and air-passages as the most certain anatomical criterion of diphtheria, but we have long known that it is possible to produce experimentally in animals, by a variety of agencies which have nothing to do with diphtheria, false membranes histologically identical with the diphtheritic membrane. Hence the mere production of a false membrane by the inoculation of a germ suspected to be the cause of diphtheria, although it constitutes weighty evidence, cannot be considered absolutely conclusive that such germ is really the cause of diphtheria. But are there not other anatomical changes in the body characteristic of diphtheria beside the diphtheritic membrane? We owe especially to Oertel the demonstration of the fact that the diphtheritic virus is a most peculiar poison to the cells of the human body, and that it produces areas of cell death not only on the surface of mucous membranes, but also in deeper parts, in various lymphatic glands at a distance from the local lesion and in the spleen. These changes can be demonstrated by histological examination. Now, if we find that our suspected germ, beside causing pseudo-membranous inflammations, produces identical foci of cell death; if we find that it injures the kidneys, as we have long known it does in human beings; and if we find that it causes late muscular paralyses resembling the post-diphtheritic paralyses which the clinician regards as of such diagnostic value in doubtful cases of sore-throat, then we shall have evidence strong indeed that this germ is the real specific cause of diphtheria.

It is not surprising that all of these difficulties were not overcome in the first important publications of Klebs in 1883, and of Löffler in 1884. We owe to Löffler the first bacteriological study of diphtheria by the modern culture methods. Although his work was most valuable and accurate, he was compelled to express himself reservedly as to the significance of the bacillus which we now believe to be the cause of diphtheria. No such complete chain of proof was brought forward as Koch presented in his first memorable publication upon the tubercle bacillus two years previously. Hence it came about that the Klebs-Löffler bacillus from the first assumed a doubtful status, and that even to-day it is often referred to in writings on diphtheria as only one among many claimants to be regarded as the cause of diphtheria.

I shall not weary you by following the historical path in which obstacle after obstacle has been removed which stood in the way of the full recognition of the Löffler bacillus as the infectious agent of diphtheria, but I shall simply direct you to the goal which has been reached.

It is now established that this bacillus is constantly present in large number in the pseudo-membranes of all cases of primary diphtheria, and that no other species of bacteria is constantly to be found in this situation. The expectation expressed a year ago by Löffler that the results on this point would not be found to be different in this country from those in Europe has been fulfilled by the bacteriological examination by Dr. Abbott and myself of a series of cases of primary diphtheria occurring in Baltimore city, in all of which we found the Löffler bacillus as the only constant organism, as well as by the latest publication of Dr. Prudden. The occurrence of a bacillus, with all of the properties of the virulent diphtheritic bacillus, in persons not affected with diphtheria is so extremely exceptional that Löffler, notwithstanding years of searching, has been able to find it only once under such circumstances.

The Löffler bacillus can be readily obtained in pure cultivation on artificial media and its properties studied outside of the body. The sum of these properties suffices for its positive and ready identification.

Inoculation of pure cultures of this bacillus is found to be pathogenic for guinea-pigs, cats, pigeons, rabbits, and some other animals. By such inoculation a disease can be reproduced identical in all essential features with human diphtheria, and there is no other species of microörganism known capable of reproducing all of these features. In suitable animals we can cause by inoculating them with the diphtheritic bacillus pseudo-membranous inflammations of mucous membranes indistinguishable from those of natural diphtheria, swelling of adjacent lymphatic glands, multiple ecchymoses, serous transudations, fatty degeneration, and other lesions in the kidney and liver, late muscular paralyses, and foci of cell-death like those in human diphtheria. Upon this last point the investigations in full have not yet been published, but researches have for some time been directed in the pathological laboratory of the Johns Hopkins University, to the detection of areas of cell-death in the internal organs of the animals inoculated with diphtheria, and I may say here that we have been able to confirm and extend in animals Oertel's researches on this subject in human beings.

By the labors, therefore, of many investigators since Löffler's first publication in 1884, including those of Löffler himself, all of the conditions have been fulfilled for diphtheria which are necessary to the most rigid proof of the dependence of an infectious disease upon a given microörganism, viz: the constant presence of this organism in the lesions of the disease, the isolation of the organism in pure culture, the reproduction of the disease by inoculation of pure cultures, and similar distribution of the organism in the experimental and in the natural disease. We are then justified in calling the Klebs-Löffler bacillus, the bacillus diphtheriæ.

Let us now turn our attention to the most important properties of this bacillus. However great may be the scientific interest of the discovery of the specific germ of an infectious disease, this discovery by itself is after all only the realization of the faith of enlightened physicians, that the infectious diseases are all caused by specific living organisms. The practitioner is fully justified in inquiring how this discovery helps him to a better understanding of the disease, to a more certain diagnosis, to a more accurate interpretation of symptoms, to more effective measures of prevention and of treatment. Although these expectations have been met only in part, enough has been accomplished already to show that great practical value has come and is likely to come in still larger measure from the discovery of the bacillus diphtheriæ.

The specific germ of diphtheria is a bacillus, devoid of independent motility, averaging in length about that of the tubercle bacillus. It presents itself both in diphtheritic membranes and in cultures, often in such bizarre forms that these belong to its most characteristic morphological properties. It grows upon our ordinary culture media, best upon Löffler's blood-serum and bouillon mixture, but it will grow even upon steamed potato. As bearing upon a possible source of infection it is important to note that the bacillus will multiply readily in milk. It does not multiply or it does so only very sluggishly at a temperature below 18° C. (about 64° F.). It is killed by exposure for ten minutes to a temperature of 58° C. (136.4° F.). It is not necessary to describe here in detail the peculiarities of its growth upon the various culture media, although to the bacteriologist these are the guides for the isolation of the bacillus in pure culture. The series of cultures which I here exhibit to you illustrate the characteristic appearances. It suffices here to draw the conclusion that, unlike the tubercle bacillus, the bacillus of diphtheria may readily find conditions outside of the body suitable for its multiplication.

But, as is well known, it is not necessary that an infectious organism should actually propagate itself outside of the body in order to produce ectogenic infection. Such infection may occur if the organism simply preserves its vitality. On this point we know that the diphtheritic bacillus, although it forms no spores, is among the more resistant bacilli of the non-spore-forming class, withstanding for a long time drying and other influences injurious to the less resistant forms. The specific bacilli have been obtained in cultures made from diphtheritic membranes preserved dry in a piece of linen cloth for five months. This property is in harmony with the experience that rooms, clothing, and other objects may retain for months the diphtheritic virus in an active state. As the diphtheritic bacilli may live for a still longer period in the moist state, and as moist, damp dwellings have long been held to be particularly favorable for the development of diphtheria, it is probable that statements as to the preservation of the diphtheritic virus in such situations for a year or more are not without foundation.

Of capital importance is the establishment of the fact that the diphtheritic bacillus develops only locally at the site of infection, and does not invade the tissues or the circulation. It is found only in the diphtheritic pseudo-membrane, and not even in the subjacent mucous membrane. Indeed, it is only the superficial parts of the false membranes which contain the bacilli. The determination of this fact gives at once a clear and decisive answer to the long-mooted question as to the primarily

local or constitutional nature of diphtheria. Diphtheria is, without a doubt, local in its origin. The germ which causes this disease not only makes its first appearance and multiplies where the pseudo-membrane is formed, but it does not even subsequently invade the blood and organs. As we shall see later, the constitutional symptoms are due to the reception of a chemical substance or substances of remarkable toxic properties, produced by the local development of the diphtheritic bacillus. This settlement of the controversy as to the local or the constitutional origin of diphtheria is one of the most important outcomes of the bacteriological study of this affection, for the question pertains to a fundamental point in our conception of the disease. Nevertheless, from the point of view from which this controversy has usually been waged, the triumph is, in my opinion, only a partial one for the localists, for, as will be shown later, I believe that there are reasons as strong as ever for the employment of constitutional measures of treatment in combination with the local ones.

From what has already been said, we are prepared to consider for a moment in what ways a person affected with diphtheria becomes a source of danger to those around him, and to the locality. The diphtheritic bacilli are conveyed from the body in particles of diphtheritic exudation, saliva, and other secretions discharged through the mouth and nose. (It is not necessary to consider here the comparatively exceptional localizations of the disease.) In this way the infectious substance may readily become attached to the person and clothing of the patient, and of those around him, as well as to the bedding, furniture, floor and walls of the room, dishes, and other objects. Notwithstanding the statements current in nearly all text-books, there is no evidence that the breath of the patient contains the diphtheritic germ, except as bits of false membrane or secretion may be mechanically expelled in the act of coughing, hawking, or sneezing. It has been proven experimentally that the expired air is incapable, during ordinary respiration, of detaching bacteria from the moist mucous surfaces over which it passes. The specific germs are not so readily conveyed by air-currents from a diphtheritic patient to those near him, as they are, for instance, from a patient with scarlet fever, in which the germs are in all probability thrown off from the surface of the body on light epidermal scales. Nor are the chances of infection of the sources of supply of drinking-water with the diphtheritic bacillus so great as is the case with such diseases as cholera and typhoid fever, in which the stools contain in large number the specific bacteria, and are likely to be disposed of in such a way that under bad sanitary conditions these bacteria may find their way into wells and streams. While there are some accounts intended to show the conveyance of the diphtheritic virus through the drinking-water, we do not hear much of this as a source of infection, and it is not likely that it plays an important *rôle*, although it is probable that the diphtheritic bacillus may sometimes be discharged by the stools.

Diphtheria is one of the infectious diseases the germs of which may be taken into the body by the inspired air. Inasmuch as bacteria cannot, under ordinary conditions, occur as floating matter in the atmosphere until they have been completely dried down so that air-currents can detach as dust the little particles to which they adhere, it is evident that only those infectious germs are likely to be conveyed by the air which are not destroyed by complete drying. As has already been mentioned, the diphtheritic bacillus withstands for months desiccation which is so injurious to the cholera vibrio and to many other species of bacteria. While, therefore, we must admit that air-infection with the diphtheritic bacillus is a real and conspicuous danger, it is well to bear in mind that modern bacteriology has taught us the great lesson that the most frequent and important mode of infection is by contact with infected substances. When we consider the manifold ways in which the diphtheritic bacilli may be widely distributed, and when we consider the habit of young children—who are the most numerous victims of the disease—of handling everything and of putting everything into their mouths, we are led to appreciate that infection by contact must play the leading part in the transmission of diphtheria.

I will now ask your attention to a brief consideration of the most deadly of all the properties of the bacillus diphtheriæ, namely, the power of producing extraordinarily poisonous chemical substances. That the grave constitutional symptoms of diphtheria are referable to such substances has long been surmised, and as soon as it was found that the bacilli causing diphtheria develop only locally it became certain that toxic substances must be formed. The results of the investigations as to the nature and properties of these substances are not only most important for the etiology of diphtheria, but are among the most significant acquisitions of bacteriology in recent years. We owe these results chiefly to the researches of Roux and Yersin and of Briéger and Fränkel.

If bouillon cultures, four or five weeks old, of the diphtheritic bacillus—preferably containing some blood-serum—be sterilized by heating them at temperatures of about 55° C., or if they be deprived of bacteria by filtration through a Chamberland porcelain filter, it is found that the sterilized culture fluid possesses highly poisonous properties when injected, even in small quantity, into animals. The toxic substance is not of a crystallizable, alkaloidal nature of the kind known as a ptomaine or a toxine, for no such substance can be detected in these cultures. The poisonous material, although it has not been separated in a condition of absolute purity, has been shown to be probably of a proteid nature. It is precipitated by alcohol and by saturation with ammonium sulphate and sodium phosphate. It is mechanically dragged down by fine precipitates, such as those of calcium phosphate. It is soluble in water. Obtained in a state approaching purity it appears as a white, amorphous mass of light specific gravity. In the moist state it loses, in great part or entirely, its poisonous properties when subjected to heat above 60° C., but when dry it stands temperatures of 70° C. It is not volatile, and can be preserved for months at least in the dry state without loss of its characteristic properties.

Some idea of the extraordinarily poisonous nature of this substance can be obtained from the statement of Roux and Yersin, that four-tenths of a milligramme of the substance (after deducting the weight of the ashes and of the non-poisonous part insoluble in alcohol) obtained by evaporating to dryness the active culture fluid,

is sufficient to kill at least eight guinea-pigs, weighing each four hundred grammes, or two rabbits, weighing each three kilogrammes. As the major part of these four-tenths of a milligramme is represented by other substances than the diphtheritic poison, it is apparent that the poison must be of appalling potency.

If this poison, or the sterilized culture fluid containing it, be injected into a guinea-pig or rabbit or other susceptible animal, it is found to be capable of producing all of the changes in the body which follows the inoculation of pure cultures of the diphtheritic bacilli, with the exception of the pseudo-membrane. For the production of this membrane the bacilli are necessary, but the other lesions, such as the local œdema after subcutaneous injections, the ecchymoses, the serous transudations, the changes in the kidney, liver, and other parts are observed after the injection of the toxic albumin, as the diphtheritic poison is sometimes called, as well as after inoculation with the bacilli. If the animals live sufficiently long muscular paralyses may develop.

The most remarkable property of this toxic albuminoid substance, or these substances (for we do not know positively that there is only one such substance), is that when injected in a single sufficiently small, but fatal, dose, it may produce no apparent disturbance for days, and the death of the animal may occur many days, or even weeks, or months after the injection. This is a quality which we have not been accustomed to attribute to chemical poisons, and it is evidently one of the greatest practical significance. If it is true that the diphtheritic bacilli are capable of producing at the site of their local development poisonous substances which, when at first received into the system, may cause no manifest harm, but which may destroy life perhaps after days, then it is clear that even if we succeed in killing the bacilli in the pseudo-membrane, the individual may still die of toxæmia.

That the bacilli of diphtheria may produce apparently identical toxic proteids in the animal body has been demonstrated. These poisonous proteids are probably allied in their constitution to the poisonous substances found by Weir Mitchell and Reichert in the venom of rattlesnakes and of other serpents, and belong to a group of interesting chemical products now known to be produced by various pathogenic bacteria and other organisms, and which have been and are still being carefully studied, among others, with especial success by Sydney Martin and by Hankin in England. While there is reason to believe that the diphtheritic poison is a proteid this view cannot be regarded as established until the poison has been isolated in a state of purity. As we know that the poison can be mechanically dragged down by fine precipitates, it is possible that it is intimately united to the precipitates of albuminose without being itself an albuminose. Interesting as it might be to tarry longer at this point, we cannot complete this outline sketch of the properties of the diphtheritic bacilli without the consideration of certain other important characteristics which they possess, and time admonishes us to hasten on.

It is well known that the character of the symptoms, and especially their gravity, vary in a marked degree not only in different cases of diphtheria, but also in different epidemics. There are epidemics of a mild character, and there are epidemics, such as some of those of recent years in the northwestern part of this country, which sweep away nearly all the children of a neighborhood or a town. In estimating the value of different methods of treatment, this is a point not always kept sufficiently in view. The question suggests itself whether there is anything known concerning the attributes of the bacillus diphtheriæ which will explain these differences.

As to this point, it is to be said that this bacillus, as obtained in pure culture from different cases of diphtheria, varies in its virulence, as tested upon animals, to a greater degree than any known pathogenic organism. Diphtheritic bacilli isolated from different cases of diphtheria, will sometimes kill guinea-pigs by subcutaneous inoculation in twenty-four hours; in other cases they require two, three, four, even nine, days to accomplish this result. From two cases of diphtheria of slight severity recently examined at the Johns Hopkins Hospital, Dr. Abbott obtained in pure culture a bacillus identical in its morphology and its behavior on culture media with the diphtheritic bacillus, but incapable of killing guinea-pigs by subcutaneous inoculation. In this respect it resembles the so-called pseudo-diphtheritic bacillus, but it differs from this organism in having been present in the diphtheritic exudate in large number. While observations are as yet insufficient to justify a positive statement, there seems to be a general correspondence between the virulence of the bacilli and the gravity of the case in which they are found, but there are exceptions to this. It is interesting to note that as a case progresses toward recovery a tendency has sometimes been observed toward a diminution in the virulence of the bacilli. It has been demonstrated that the less virulent the bacillus, the smaller is the amount of the toxic proteid which it is capable of producing in cultures, this substance being replaced, according to Fränkel and Brieger, by another albuminoid product devoid of toxic properties. While other factors may be, and doubtless are, concerned in determining the severity of a case of diphtheria, it is evident that the demonstrated variability in virulence of the diphtheritic bacillus affords an explanation of many of the differences observed in the onset and decline of an outbreak of diphtheria and in different epidemics of this disease. The existence of an attenuated variety of the diphtheritic bacillus, which may under circumstances which we do not now understand, acquire virulence, is unquestionably of great significance in the epidemiology of diphtheria.

Roux and Yersin have brought forward a number of reasons for regarding the so-called pseudo-diphtheritic bacillus (that is a bacillus resembling, if not absolutely identical with, the diphtheritic bacillus, in its morphology and its behavior on culture media, but incapable of killing animals) as an attenuated form of the bacillus diphtheriæ. In the two cases of apparent diphtheria referred to, in which a bacillus, which we could not distinguish from the ordinary diphtheritic bacillus, save by absence of pathogenic properties when inoculated into guinea-pigs, there was a thin, grayish, pseudo-membranous deposit on the tonsils, and the symptoms were of a mild character. The bacilli were present in large number and were mingled in each case with a large number of the

golden pyogenic staphylococci. It would be interesting to determine whether the virulence of the diphtheritic bacilli may be modified by the presence of other bacteria. Whether or not we are justified in regarding the two cases of pseudo-membranous angina referred to as genuine diphtheria cannot be decided until the status of the pseudo-diphtheritic bacillus is settled.

I wish now to say a few words concerning the diagnostic value of the bacillus of diphtheria, and this will afford a convenient opportunity of touching also upon the existence of very mild cases of diphtheria and upon pseudo-membranous anginas, which are not due to the diphtheritic bacillus.

While typical cases of diphtheria, especially when occurring during an epidemic, offer no especial difficulties in diagnosis, every practitioner of experience will admit that cases occur often enough which he does not know whether to call diphtheria or not. If the case is a mild one, with whitish patches on the tonsils or pharynx, which soon disappear, and constitutional symptoms are slight, he does not generally venture to make a diagnosis of diphtheria. Still the diagnosis in just this class of cases is of great importance, for such a case may be a dangerous source of infection to others.

Now we possess in the detection of the Klebs-Löffler bacillus a positive means of diagnosis of diphtheria, and it is to be considered how far this means is available to the general practitioner. The bacteriological method of diagnosis involves, first, the microscopical examination, with an oil-immersion objective, of properly stained cover-glass specimens of the suspected inflammatory exudation; second, the preparation and study of cultures from this exudation made upon suitable media, preferably Löffler's blood-serum and bouillon mixture; and third, in some cases the inoculation of a guinea-pig with the pure culture. In many cases the mere microscopical examination of cover-slip preparations from the exudation will suffice, but the diphtheritic bacillus cannot be identified in this way so positively as the tubercle bacillus, for instance; and in just the class of cases where doubt as to the diagnosis is likely to exist, this procedure is most apt to prove insufficient. The examination of the cultures can be made the day following their preparation, and in nearly all cases this will afford a positive answer. The preparation of the cultures requires some training in bacteriological methods, and also a modest outfit of bacteriological apparatus. To a person thus equipped the examination offers no especial difficulties. Now, although Roux and Yersin have attempted to popularize the method, and have urged its general adoption by medical practitioners, I do not think that under existing circumstances it is likely to be widely applied in general practice. The method can be readily employed in hospitals and children's asylums, where it is calculated to be of great service, and in most large cities probably some one will be found who can be called upon to conduct such examinations. As the importance of practical training in bacteriology becomes more widely recognized in medical teaching, a larger number will enter upon the practice of their profession prepared to employ bacteriological methods of diagnosis.

The diphtheritic bacillus has been found in a number of cases of inflammation of the tonsils and pharynx in which the exudation and the symptoms were not sufficiently characteristic to permit a positive diagnosis in any other way than by the recognition of the specific bacillus. We do not possess sufficient information to be able to say how frequent these cases, which are generally of a very mild character, are, or how they can be diagnosticated by a merely clinical or anatomical examination. That they are not infrequent during the epidemic prevalence of diphtheria seems probable from clinical experience.

The view which has been widely advocated, that most cases of so-called follicular tonsillitis, which, as is well known, may prevail as an epidemic and may present marked but not dangerous constitutional symptoms, is a form of diphtheria not supported by bacteriological examination. In these cases the diphtheritic bacillus is usually absent, but under the rather vague name of follicular tonsillitis are doubtless included some cases of genuine mild diphtheria.

Not all pseudo-membranous inflammations of the throat are caused by the specific bacillus of diphtheria. It has been demonstrated by Wurtz and Bourges that this bacillus is absent, and that a streptococcus is present in nearly all cases of pseudo-membranous angina developing in the early stages of scarlatina, so that most cases of so-called scarlatinal diphtheria are not diphtheria at all, if we limit, as seems best, the term diphtheria to the affection caused by the Löffler bacillus. The Löffler bacillus is, however, present in the diphtheria appearing in the late stages of scarlatina and during convalescence, and it seems that scarlet fever is a predisposing cause of the development of genuine diphtheria.

In a series of cases, numbering 24, of pseudo-membranous inflammations of the tonsils, pharynx, and larynx, designated at the time as diphtheria, Dr. Prudden found in all but two a streptococcus, and in none the Löffler bacillus. These cases were, for the most part, either secondary to scarlatina, measles, whooping-cough, or erysipelas, or developed under the same epidemic influences as these diseases, so that these cases probably should not be regarded as genuine diphtheria. This is the view now held by Dr. Prudden himself in his latest publication, according to which renewed observations in cases of primary diphtheria have convinced him of the causative significance of the Löffler bacillus. Roux and Yersin, whose work has contributed largely to the present recognition of the Löffler bacillus as the cause of diphtheria, have also examined with negative result, so far as this bacillus is concerned, a few cases with pseudo-membranous deposits on the tonsils and pharynx of such a character that the clinician had no doubt of the existence of diphtheria. We must admit, therefore, that pseudo-membranous inflammations of the throat resembling diphtheria occur, both secondary to infectious diseases and apparently primary, in which the Löffler bacillus is not found. The further etiological study of these cases and their more precise characterization as to clinical history and pathological anatomy constitute a promising field of investigation. Until certain points have been cleared up by such investigation, there may be a certain amount of confusion as to the conception of diphtheria, but this affection seems to me even now sufficiently well characterized as to its symptomatology, pathological anatomy, and etiology to constitute a definite and independent disease which need not be confounded with other diseases.

A few words may be appropriately introduced here as regards the use of the term diphtheria. The term diphtheritis or diphtheritic inflammation is used in an anatomical sense to designate a certain kind of pseudo-membranous inflammation of a mucous membrane which may be produced by a variety of causes. The designation of certain other varieties of pseudo-membranous inflammations of mucous membranes as croupous and as pseudo-diphtheritic still further complicates the terminology. It is now generally recognized that it is best to limit the use of the word diphtheria to a definite disease and not to an anatomical process. This disease may appear in the form of each or all of the varieties of pseudo-membranous inflammations mentioned. It has for some time been clear that the boundaries of the disease which should be called diphtheria cannot be sharply drawn save on etiological grounds. So long as these grounds were lacking the boundaries were uncertain, vague, and fluctuating. We now possess definite criteria for the recognition of the disease, and it seems to me that instead of saying that diphtheria may be caused by a variety of microörganisms, a statement which is undoubtedly true if we understand by diphtheria all pseudo-membranous inflammations of the throat, it conduces to clearness and definiteness to confine the term diphtheria to the disease caused by the Klebs-Löffler bacillus. This will not necessitate material deviation from ordinary usage. The etiological basis of classification of disease is the surest and best, and in this case it will doubtless be found to correspond to a symptomatic and anatomical entity.

The data at present at hand are insufficient to settle the burning question as to the existence, independent of diphtheria, of a disease called membranous croup, supposed to be of a purely local, non-contagious character. Not a few cases of pseudo-membranous laryngitis without membranes on the tonsils or pharynx have been examined with the result of finding the Löffler bacillus. One such case, diagnosticated by the physician as croup, will be found in the series reported by Dr. Abbott and myself. In this we detected in large number the diphtheritic bacilli on the mucous membrane of the pharynx although no membranous deposit was visible, and similar results have been recorded by others, so that there is no doubt that diphtheria may occur with membranous inflammation limited to the larynx. In Dr. Prudden's first series of cases there were some instances of pseudo-membranous inflammation confined to the larynx and trachea in which streptococci, but no Löffler bacilli were found, so that it is probable that pseudo-membranous laryngitis, without involvement of the tonsils or pharynx may be produced by the streptococcus. But whether or not membranous croup may occur in the sense advocated as a purely local, non-contagious affection cannot be said to have been settled by bacteriological investigations.

An account of the results of the bacteriological study of diphtheria would be incomplete without some reference to pathogenic bacteria, which are frequently, although not constantly, found associated with the Löffler bacillus in diphtheritic exudations. These associated bacteria may be the cause of grave complications. Diphtheria is no exception to the rule that all necrotic and ulcerative processes on mucous surfaces where bacteria normally occur open the way to the invasion of pathogenic bacteria, especially to the widely distributed pyogenic streptococci and staphylococci. Mention has already been made of the probable causation of certain secondary pseudo-membranous anginas by a streptococcus. The same or apparently the same streptococcus is very commonly present in diphtheria. It is usually held to be identical with the streptococcus pyogenes. This organism, unlike the Löffler bacillus, is capable of invading the blood and tissues. The most frequent and important complication produced by this streptococcus in diphtheria is broncho-pneumonia, which develops as an aspiration pneumonia, as has been shown by the investigations of Prudden and Northrup. The common pus-producing bacterium, the staphylococcus pyogenes aureus is, next to the streptococcus, the most common pathogenic bacterium complicating diphtheria. It is to the invasion of these secondary bacteria that such complications of diphtheria as acute ulcerative endocarditis, suppuration of lymphatic glands, inflammations of serous membranes, and erysipelas are referable.

A matter which, although not new, has attracted much attention in recent years, may prove to be of such importance in the etiology of diphtheria that I will direct your attention to it for a few moments. Evidence has been brought forward intended to show that diphtheria may be communicated to human beings by domestic animals afflicted with this disease. The animals chiefly concerned are cattle, cats, and fowls. There have been reported in England during the last decade epidemics of diphtheria in which the evidence is strong that the diphtheritic germ was conveyed in milk. There are two theories as to these milk epidemics. One is that the diphtheritic virus got into the milk from persons affected with diphtheria, the other is that the cows yielding the milk were affected with diphtheria. This second daring hypothesis Klein has attempted to support by experiment. He claims that by the inoculation of two cows subcutaneously on the shoulder with a broth culture of the bacillus diphtheriæ he has succeeded in producing genuine infection with the appearance of vesicles and pustules on the udders and the elimination of the specific bacilli by the milk. These experiments should be received with great caution, as they are in opposition to all that we know concerning the exclusively local development of the bacilli at the point of inoculation. We possess no satisfactory evidence that cattle are ever affected with a natural disease identical etiologically with human diphtheria, although it is known that an affection sometimes called diphtheria may appear in calves.

That cats may acquire diphtheria and may be a means of transmitting the disease to human beings is a widely-spread belief. Medical literature contains many instances in which, on the one hand, cats appear to have contracted a disease by eating substances contaminated with the discharges from diphtheritic persons; and, on the other hand, children seem to have become infected with diphtheria by handling sick cats. Noah Webster, in his curious book on *Epidemic and Pestilential Diseases*, published at the end of the last century, noted the coincidence of cat distempers with malignant angina. In the recently published *Annual Report of the Local Government Board of England*, Klein has brought to-

gether the evidence to be found on this point. Inasmuch as cats are among the animals most susceptible to inoculation with cultures of the Löffler bacillus, acquiring a disease resembling human diphtheria, there is no *à priori* reason why they may not be the subjects of a natural disease etiologically identical with diphtheria. But the possibility of the experimental production of a disease in an animal is no proof of the natural occurrence of such disease; and thus far there is not satisfactory evidence that diphtheria occurs as a natural disease in cats. What is necessary to settle this question is to make careful bacteriological studies in suspected cases of diphtheria in cats. The matter is of sufficient interest and importance to merit careful study, and we should be glad of the opportunity of making examinations in suitable cases which may come to the notice of physicians in this vicinity.

Pigeons also are susceptible to inoculation with the Löffler bacillus, and it is well-known that a membranous inflammation of the mouth, fauces, and trachea occurs as a destructive epidemic in chickens, turkeys, pigeons, and other birds. This so-called diphtheria of fowls has not, however, been found to be caused by the same microörganism which causes human diphtheria, so that notwithstanding some rather striking observations according to which human beings have appeared to contract diphtheria from fowls, there is no positive proof of the dissemination of genuine diphtheria in this way. It may be that human beings may become infected by the germs producing the so-called diphtheria in domestic animals, but if so, there is no proof that the disease produced is etiologically identical with the disease caused by the Löffler bacillus.

We have now passed over, gentlemen, in rapid survey, some of the leading factors concerned in the causation of diphtheria. The limits of an address do not permit an exhaustive consideration of the subject even from the bacteriological point of view. Many circumstances of great importance in the etiology of diphtheria, such as the influence of unsanitary surroundings, particularly those of a domestic character, and the often dominant *rôle* of school attendance upon the dissemination of the disease could not be considered. These, however, are etiological factors which can be more profitably discussed from an epidemiological than a bacteriological point of view.

I have already made such demands upon your patience that I have not left myself sufficient time for any adequate consideration of the prophylaxis and treatment of diphtheria—subjects, indeed, which would furnish ample material for a separate discourse. I am glad to see that the subject of the treatment of diphtheria is to be presented in a special paper before this meeting. I cannot refrain, however, from directing your attention to a few of the general principles controlling methods of prevention and of treatment of diphtheria, and from pointing out the directions in which our increased knowledge of the causation of diphtheria leads us in our search for more effective measures to these ends.

The very fact that we are no longer groping in the dark, but that we know the enemy, his strength and his weakness, should inspire our courage and hope, should make us forge new weapons and sharpen our old ones, and should point out where to ward off attack and where to force the battle.

The possibility of making an early diagnosis of diphtheria by the aid of bacteriological examination enhances the chances of success in coping with this disease, both in prevention and in treatment, and, as already intimated, provision should be made in hospitals and children's asylums for making such examinations.

Inasmuch as the diphtheritic bacilli are present only in the false membranes and other local products of the disease at the site of infection, and are distributed outside of the body primarily through these, it is apparent that the patient should be strictly isolated; that unnecessary fabrics and other objects, especially such as cannot be readily disinfected, should be first removed from the room where the patient is placed; that care should be taken to prevent, as far as possible, the soiling of the person and clothing of the patient, of the attendants, and of the physician, as well as that of other objects in the room, with the discharges of the patient; that opportunity should not be afforded for the desiccation of these discharges, which then may contaminate the air, and that efficient measures of disinfection of the room and of all objects which by any possibility can become infected should be employed. That the enforcement of the measures indicated is capable of restraining the spread of the disease, even in crowded infants' asylums and hospitals, has already been demonstrated by actual experience. They require for their accomplishment education on the part of the community, of physicians, and of sanitary authorities in the principles of disinfection, and an intelligent appreciation of the dangers to be guarded against. I seize this occasion, as I have others, to urge the importance in cities of public disinfecting establishments, constructed according to improved modern principles, and of a corps of men in the employment of boards of public health, trained in proper methods of disinfection.

The length of time that the patient should be quarantined depends evidently upon the duration of the period in which active diphtheritic bacilli remain on the mucous surfaces attacked. As to this point we possess some definite information, which shows that the period varies within wide limits. In some cases the bacilli can no longer be found after the false membranes have completely disappeared; in many cases they vanish within three or four days after the local inflammation has subsided, but they have been found as much as fourteen days after the inflammation has gone, and when the mucous membrane appeared healthy. In a case reported by Löffler, the bacilli were found three weeks after the return of the temperature to the normal, and were present for a month altogether in a state capable of carrying infection. It is evidently not possible to set a precise limit for the period of isolation of the patient. Löffler suggests that the patient should not be permitted to mingle with others or to return to school for at least eight days after the disappearance of all local manifestations, and he reckons four weeks from the beginning of the disease as the period for keeping the children out of school. Where it is possible to do so, the length of this period can be controlled by bacteriological examinations of the mucous membrane of the throat.

We have thus far considered the patient as the immediate source of infection. The evidence already men-

tioned in favor of the occasional dissemination of the diphtheritic virus through the milk suggests at once the importance of controlling, not only the condition of the milk as received for distribution, but also of inspecting the sources of milk supply. Evidently milk should not be permitted to be sold from dairies attached to households where there are cases of diphtheria.

It does not seem to me permissible to throw out altogether the possibility of the conveyance of diphtheria by domestic animals, especially by cats, which are likely to be fondled by children even more when the animals are sick than when they are well.

In considering what can be done to render children less vulnerable to diphtheria, and to ward off an attack after exposure to the disease, the question arises, what conditions of the individual we may regard as predisposing causes. Clinical experience, as well as experiments upon animals, indicate that morbid states of the mucous membrane of the throat, such as ordinary catarrhal inflammations, swollen tonsils, sensitiveness to "catching cold," the existence of measles and scarlatina, are predisposing factors. At all times, but especially during the epidemic prevalence of diphtheria, it is important to hold in check these morbid states as far as possible. Experiments upon animals would seem to indicate that some lesion of the mucous membrane is essential for the lodgement and multiplication of the diphtheritic bacilli, but it would be entirely unjustifiable to transfer directly to human beings the results of these experiments without warrant from clinical experience, and while this experience shows the importance of such lesion, it also shows that perfectly healthy children may be attacked by diphtheria, so that we have no right to assert that in human beings infection with the diphtheritic bacilli cannot occur without preëxisting alteration of the mucous membrane. The frequency and readiness with which the tonsils become the seat of the diphtheritic process may be explained by the peculiar anatomical structure of these parts, as has been shown by the researches especially of Stöhr and of Hodenpyl. The rarefaction of the covering epithelium and the emigration of leucocytes to the surface found as a normal condition, seem to render the tonsils particularly vulnerable to the lodgement of the diphtheritic bacilli, and the lymphatic structures, here normally laid almost bare, are favorable for the absorption of the toxic products of the bacilli, as has been pointed out in the recent interesting paper of Hodenpyl, "On the Anatomy and Physiology of the Faucial Tonsils."

The prophylactic value, in persons liable to exposure to diphtheria, of cleanliness of the teeth and mouth and of the frequent use of weak antiseptic mouth-washes, nasal douches, and gargles is worthy of the attention of physicians. For this purpose Löffler recommends aromatic waters, weak sublimate solutions (1 : 10,000 to 1 : 15,000), or, perhaps better, solutions of mercuric cyanide (1 : 8000 to 1 : 10,000); also, chloroform water, chlorine water (1 : 1100), thymol (1 : 500 parts of 20 per cent. alcohol). The use of some of these solutions evidently involves danger of poisoning in children unless special precautions are taken.

The suggestion recently made by Dr. Jacobi, that, in addition to caring for those sick with diphtheria, places of refuge should be provided for the temporary stay of children sent from home to escape infection, seems practical and calculated to meet the circumstances of many families.

The dominant *rôle* often played by schools in the spread of diphtheria throughout a community renders especially urgent the introduction of a system of daily medical inspection of the schools.

The importance of letting air and sunlight into dark, damp dwellings, and of attending in general to matters of domestic sanitation, is a lesson plainly to be drawn from the history of such places as nests of diphtheria.

If the researches relating to the etiology of diphtheria which have been so fruitful in recent years have not added to the list of agents—whose name is legion—employed in the treatment of this disease, they have given precision to the indications for treatment. From what has been said concerning the localization of the diphtheritic bacilli, and the peculiar characters of the toxic substances produced by them, it is apparent that the strongest indications exist, on the one hand, for the earliest possible local treatment by germicides, and, on the other, for the destruction of the poison in the system, and, in the absence of any antidote, for supporting measures of treatment which shall enable the body to withstand the effects of the poison.

The superficial situation of the specific bacilli in diphtheria seems to render this disease especially favorable for effective local antiseptic treatment, but the difficulties encountered in actually destroying the germs in the diphtheritic deposits, even when these are accessible to local applications, emphasize the fact that the obstacles to thorough disinfection within the human body are exceedingly great. Many of our most powerful antiseptics, when they come into contact with the tissues and fluids of the body form precipitates which render them largely inert, and for this and other reasons they penetrate but slowly or not at all beyond a very superficial extent. But above all we are hampered by the fact that nearly all disinfectants are many times more poisonous to the cells of the human body than they are to bacteria.

But notwithstanding the difficulties mentioned, and still others suggest themselves, it has been shown both by bacteriological examinations and by clinical experience that local disinfectant applications in diphtheria are useful and may cause the specific bacilli to disappear. An important experimental study of the action upon the diphtheritic bacilli of many germicides and agents used in treating diphtheria has been recently published by Löffler, who endeavored to imitate as far as possible in test-tube experiments the conditions present in the mucous membrane when affected with diphtheria. I can only refer you to Löffler's work and his recommendations. Any attempt to consider here therapeutic agents would lead us far beyond the limits of our subject as well as of our time.

Even if it were within the power of the physician to bring about the complete destruction of the diphtheritic bacilli after the disease has taken firm hold, he would nevertheless in many cases be called upon to combat the effects of the toxæmia resulting from the absorption of the toxic albumin already produced by the bacilli. In this respect there is an analogy between diphtheria and tetanus. In both of these diseases the specific bacteria develop only locally at the site of infection, where

they produce substances of extraordinarily poisonous power which enter the circulation. In the case of tetanus we are familiar with the fact that even the complete removal of the infected part will not prevent a fatal issue after a certain amount of poison has been produced and has entered the system. Experiments already mentioned have shown that animals may be killed by the injection of an amount so small of the toxic albumin produced by the diphtheritic bacilli that for several days no symptoms are manifested. The physician certainly cannot neglect the dangers of intoxication by such a substance as this.

The interesting experiments of Behring and Kitasato upon the production of immunity against tetanus and diphtheria, encourage us to hope that we may in time come into the possession of direct antidotes to the chemical poisons of these diseases. These experiments have shown that the blood and the blood-serum of animals naturally or rendered artificially immune against diphtheria, possess the remarkable property of neutralizing or destroying the toxic substances produced by the diphtheritic bacilli, and that immunity depends upon this property. The same is true of tetanus. Whether or not any therapeutic application in human beings can be successfully made of this property of the blood of immune animals, has not yet appeared.

Failing any such antidote, it should be the aim of the physician to assist nature to withstand the poison by supporting the strength of the patient in every way possible by remedies and food.

I have attempted, gentlemen, in this address to show, although necessarily in an imperfect and fragmentary manner, that the discovery of the bacillus diphtheriæ and the study of its properties has rendered our knowledge of diphtheria in many ways more accurate and fuller, has settled many questions of controversy, and has dissipated some errors. The new light has not yet penetrated into all of the dark corners, but when we consider what has been gained in less than a decade, we are justified in expecting that here also obscurity will disappear, and that diphtheria will become in all respects one of the best understood, and, we may hope, one of the most successfully combated of the grave infectious diseases.

MEDICAL PROGRESS.

Ergot for Gonorrhœa.—ROICKI, in the *Gazette de Gynecologie*, considers ergot as an excellent infection for the rapid cure of chronic gonorrhœa. He administers it at the same time by the mouth in the form of pills, and by urethral injection after the following formula:

℞.—Ergotin . . . . . 4½ grains.
Distilled water . . . 9 ounces.

Use as an injection several times a day.

These injections are very well borne. The same treatment is also applicable for other urethral hæmorrhages.

Salicine for Pelvic Pain.—CHÉRON states that in pelvic pain during the course of metritis or salpingo-ovaritis as well as in pelvic cellulitis and peritonitis, particularly if these troubles are associated with rheumatism, that salicine is of value. In those women who, after the menopause, have uterine pain and discomfort in the lumbar or sacral region, with occasional flushes of heat and neuralgic dartings, a careful interrogation as to any history of rheumatism should be sought for, and if this disease is found to be present salicine administered. The dose which he ordinarily recommends is fifteen grains, to be divided into three parts. Very soon after the drug is administered the pain decreases. Chéron generally directs that one drachm of salicine be divided into twelve capsules. One of these capsules may be given morning, noon, and night, the patient taking a glass of water at the same time, to prevent irritation of the stomach.

Treatment of Infantile Chlorosis.—ELOY gives the following summary of the best treatment, in his opinion, of this condition. He points out that with children, as well as adults, medication should be chiefly hygienic, and associated with the use of arsenic and iron. The hygienic treatment consists in the use of outdoor exercise and baths, though he does not approve of the sojourn by the sea, but prefers residence in the mountains. Gymnastic exercise, and those movements which tend to increase the respiratory capacity and develop the muscles of the thorax, are particularly indicated. The baths, when administered, should be, as a rule, salt baths, and cold water should be most carefully, if ever, employed. The diet should be carefully arranged; only foods which are readily digested should be given, and those meats which are particularly nutritive administered. As gastric dilatation, alterations in the gastric juice or constipation may all be causes of chlorosis, they should be remembered when treating such cases. The medicinal treatment consists in the administration of small doses of quinine and the following prescription, particularly if constipation is constantly present:

℞.—Phosphate of soda . . 1½ drachms.
Phosphate of potassium . ½ drachm.
Red wine . . . . 6 ounces.
Syrup of bitter orange . 1 ounce.

A teaspoonful to a dessertspoonful after each meal.

In other cases it may be well to administer, in solution or syrup, the phosphate of calcium in small doses. If the child is old enough to take bitter substances, it may use the following:

℞.—Tincture of cascarilla
" gentian
" rhubarb
} of each, 1½ drachms.

Sometimes the tincture of gentian may be replaced with tincture of calumba with advantage. For the improvement of the digestion the following may be employed:

℞.—Dilute hydrochloric acid . 15 minims.
Syrup of bitter orange-peel 1 ounce.
Tincture of bitter orange-peel 1 drachm.
Infusion of cascarilla . . . 2½ ounces.

A teaspoonful after each meal.

It may also be well to employ some of the aërated waters. In regard to the salts of iron, Simon uses the lactate of iron; but in other cases the phosphate of iron may be given. Small doses should, of course, be given,

as iron under these circumstances should not be given in large enough amounts to produce constipation. Arsenic, when administered, should be given in small doses, and carefully watched lest it produce irritation of the kidneys or gastro-intestinal tract.

Treatment of Amenorrhœa.—

℞.—Bichloride of mercury . . . 3 grains.
Arsenite of sodium . . . 3 "
Sulphate of strychnine . . 1½ "
Carbonate of potassium } of each 45 "
Sulphate of iron }

Make into sixty pills and give one pill after each meal. —*Revue Méd.-chir. des Mal. des Femmes.*

Prescription for Eczema of the Anus and Genital Organs.—LUSTGARTEN advises, in *La Semaine Médicale*, the following ointment:

℞.—Oleate of cocaine . . 15 to 30 grains.
Lanolin . . . . 1 ounce 2 drachms.
Olive oil. . . . 2½ drachms.

Use externally.

Make an application of this ointment twice daily, and after each application powder the affected part with any absorbent powder whatever. Warm soap baths will aid in curing the disease. In pruritus ani, suppositories of cocaine can be employed with advantage.

Aphrodisiac Pills.—According to the *Journal de Médecine de Paris*, LUTAUD employs the following pills for the purpose of producing sexual stimulation:

℞.—Powdered nux vomica . . ¾ grain.
Bromide of iron . . . 15 grains.
Phosphorus . . . . ⅙ grain.
Excipient, a sufficient quantity.

Make into twenty pills and take one each night.

In addition to this treatment the patient should resort to hot and cold douches and gymnastic exercise, massage, and systemic tonics, and frequently coca will be found of value, as in the opinion of Lutaud this drug possesses very distinct aphrodisiac powers.

Treatment of Gonorrhœa by Bicarbonate of Soda.—According to the *Journal de Médecine de Paris*, CASSELAN during the past four years has employed a solution of bicarbonate of soda in the strength of 1 : 100 in the treatment of gonorrhœa. He has treated thirty-three cases and obtained thirty-three cures in from two to three weeks by the employment of injections of the solution named. He bases his treatment on the belief that the virulence of the disease is in direct proportion to the acidity of the secretions.

Influence of Acute Fever upon the Course of Pulmonary Phthisis.—According to the *Revue Internationale de Bibliographie*, CHETMOUSKI believes that a high temperature due to another disease very distinctly influences the course of pulmonary phthisis. This Russian clinician, in support of his views, refers to the case of a woman, aged thirty years, who was suffering from very distinct evidences of pulmonary phthisis, who developed erysipelas of the face accompanied by high fever. Simultaneously with the development of the intercurrent disease the pulmonary symptoms immediately diminished, and during the next eight days the bacilli disappeared from the sputum. The cough was decreased and an ulceration of the palate underwent cicatrization. In another case occurring in the person of a physician, aged thirty years, in whom there was consolidation of the apex of the right lung with bacilli in the sputum, typhus fever manifested itself. The fever lasted fourteen days, and convalescence was rapid. Immediately before the fever the patient's weight was 140 pounds, three months afterward 170 pounds, and the cough had almost disappeared.

The Treatment of Typhoid Fever.—SMAKOVSKY, during the space of two and a half years has treated 700 cases of typhoid fever in the following manner:

℞.—Calomel . . . . . ½ grain.
Sugar . . . . . 4 grains.

This is to be made into ten powders and one powder given each hour until the evacuation from the bowels becomes copious and soft. The patient is also given a gargle, composed of a solution of chlorate of potash, to prevent mercurial stomatitis. If there are evidences of feebleness of the heart, the calomel is stopped and small doses of the infusion of digitalis are administered. After the calomel has produced its antiseptic and alterative influence the diarrhœa, if it has become excessive, may be controlled by the use of the following powders:

℞.—Subnitrate of bismuth . . 2 grains.
Naphthalin . . . . ½ grain.
Sulphate of quinine . . 1 "

One of these powders is to be given four times a day. For the cough Smakovsky recommends:

℞.—Aqua ammonia . . . 1 drachm.
Tincture of eucalyptus . 1 ounce.
Essence of peppermint . 10 drops.

Ten drops to be given every two hours. This prescription is also of advantage in acting as a disinfectant of the mouth. The Russian investigator just named is convinced that the mortality of typhoid fever under such treatment is very much lessened. — *L'Union Médicale.*

Ointment for Intertrigo.—

℞.—Boric acid . . . . . 7 grains.
Lanolin . . . . . 12 drachms.
Vaseline . . . . . 3 "

This ointment is to be applied to the diseased area, which is first cleaned by the use of a mild soap.

Purgative Pills.—

℞.—Aloes . . . . . 15 grains.
Resin of scammony . . . 7 "
Resin of jalap . . . . 7 "
Calomel . . . . . 7 "
Extract of belladonna . . 3 "
Extract of stramonium . . 3 "

Make into twenty-five pills and give one to two a day.

CURRENT LITERATURE.

SATURDAY, MAY 16, 1891.

TACHYCARDIA AT THE MENOPAUSE.

PROFESSOR E. HEINRICH KISCH defines tachycardia as a purely nervous disturbance of the heart function, independent of every organic disease of the heart and vessels, and characterized by a motor change of the heart function, by which a marked, and at times extraordinary, increase in the frequency of the contraction of the heart occurs. It is found associated with anæmia, cachexia, neurasthenia, and with diseases of the stomach, diphtheritic angina, diseases of the lungs, brain, spinal cord, and sexual organs.

Kisch directs attention to a form of tachycardia which occurs in women at the menopause. He gives brief accounts of the previous observations on this point by Stokes, Moon, Groedel, Clément, and Boerner. His own experiences have been obtained at the health resort in Marienbad, where women at the climacteric, with their manifold difficulties, make up the chief contingent. At this time of life, if the menses begin to appear at longer or shorter intervals than the normal period, cease altogether for two or three months, or, if the blood excreted assumes an abnormal character, a woman, whose heart up to that time was acting perfectly normally, complains of palpitation which occurs in paroxysms. This palpitation appears at times without any cause, at times after an insignificant cause, which before did not excite nerve action. The attacks occur in any position, walking, sitting, lying, and even during sleep. The feeling of accelerated and strengthened heart-beat is described as very annoying, and is at the same time associated with a feeling of anxiety, with the sensation of pressure upon the breast, beating in the carotids, and pulsation of the abdominal aorta. Moreover, the patient feels as though the blood was surging toward the head, and has fleeting "beats" and violent headache. Occasionally, toward the close of the paroxysm of tachycardia, there are bright spots before the eyes, noises in the ear, dizziness, and, but rarely, faintness.

The pulse is increased in frequency from 120 to 150, and in Kisch's cases was generally strong, well filled, and regular. Sphygmographic tracings show a pulse of considerable volume, low tension, and sub-dicrotic or dicrotic. The heart-sounds are pure. At times, during an attack, the face, throat, and breast become suddenly red. Bright red spots appear suddenly upon the parts named, and disappear usually in a few minutes; they are associated with burning feelings; at times sweat breaks out upon the head and back. These attacks of tachycardia may occur several times a day, or cease for several days, and may last from several minutes to a quarter of an hour.

The tachycardia is also usually associated with a condition of bodily and mental disquiet, incapacity for regular activity, restless sleep interrupted by dreams, and a general nervous excitability. Kisch does not agree with Clément and Boerner that anæmia is always present in these women. In most of his cases there was plethora. There was neither marked dyspnœa nor cardiac asthma present; symptoms of stasis were very rarely observed; œdema of the feet was present in individual cases, though the urine was always free from albumin.

Kisch says he has seen, in the past five years, twenty-eight cases of paroxysmal tachycardia in women at the climacteric. Of these patients 25 were between forty and fifty years of age. The menses were irregular in 26, and had completely ceased in 2. One patient was unmarried, 2 were sterile, the remaining 25 had borne several children. A sudden cessation of the menses had not occurred in any case. In 12 cases, in addition to the paroxysmal tachycardia, there was disturbance of the stomach and bowels, which Kisch has described as uterine dyspepsia. He thinks it noteworthy that in three of the women there had been, at the beginning of menstruation in childhood, nervous palpitation, which subsequently completely disappeared.

The duration of the disease may be from a few weeks to two years or more. It may persist as long as the irregularity of the menses persists, but may also extend beyond this period, and may still occur when menstruation has entirely ceased; but Kisch has not observed any bad sequelæ of significance.

Kisch has found that the systematic employment of gentle purgatives, conjoined with appropriate diet, exercises a very favorable influence for the amelioration of the attacks. His course consists in residence in mountain air, bland food, active bodily movements, cold washings, and moist applications to the belly. He finds the sulphate of soda waters of Marienbad very effective. Bromides, in small doses, are given for the disagreeable feeling of palpitation, and as a quieting remedy.

As to the etiology, Kisch traces it directly to changes occurring in the ovaries at the time of the climacteric.—*Prager med. Wochenschrift*, March 11, 1891.

PATHOGENESIS OF THE AMŒBÆ OF DYSENTERY.

KARTULIS, of Alexandria, complains that specialists in parasites have ignored the importance of the amœba in dysentery, notwithstanding the fact that his researches have been confirmed by observations in Russia, Bohemia, Greece, and America. He maintains that the amœbæ occur not only in all true cases of dysentery, but also always in dysenteric liver abscesses. He has repeatedly sought for the amœbæ in hundreds of cases of other intestinal affections, but has never found them.

After a number of experiments Kartulis found that the best medium for the cultivation of the amœbæ was prepared by boiling for fifteen minutes twenty or thirty grammes of fresh straw in two litres of water. The fluid is then filtered and sterlized. Large-sized test-tubes, holding 50–100 c.cm., may be used, and are filled with the fluid. A few drops

of the slimy masses in a fresh dysenteric stool are then mixed with the fluid in the tubes, which should be kept in an incubator at a temperature of 86° or 100° F. After the lapse of twenty-four or forty-eight hours there forms on the surface of the tube a film like spider's web, which consists of freshly developed amœbæ, in addition to many bacteria. The amœbæ grow best when the vessels are left exposed to the air. The amœbæ of the cultures are much smaller than those of the stools, have a lively movement in wandering spore form, but throw out no pseudo-pods. Ciliæ are absent, but nucleus and vacuoles are very distinct, especially when the bodies are stained with aniline colors. Here and there are seen some amœbæ, which are like in form and size those used for inoculating the tube. Very often, also, there are seen small forms, round, homogeneous, and glistening, which have a rapid and dancing motion. These take the aniline colors intensely, and Kartulis regards them as free nuclei.

The spores gradually develop to large amœbæ. The amœbæ then execute movements by throwing out pseudo-pods. Toward the fourth and fifth days there are seen between the lively amœbæ, forms which are much smaller, about the size of a white blood-corpuscle. They are round, quiet bodies with a fine contour, small nucleus, and fine protoplasm. The forms become smaller gradually, form two contours, which appear yellowish, with dark protoplasm. Their sizes vary between 5 and 7 m. As amœbæ develop from these forms, there is no doubt that they are spores. Within eight or eleven days the spores increase; the amœbæ are very sparingly present.

In order to develop the spores further it was found necessary to add neutral, or slightly alkaline, bouillon to the fluid in the culture vessel. Kartulis has seen old spores, kept at the temperature of the room for four months, develop in this medium. He has never been able to develop amœbæ from the stools of non-dysenteric patients. His efforts to obtain pure spores were unsuccessful. Only once did he succeed in carrying the amœbæ through three cultivations free from other microörganisms.

Efforts to inoculate rabbits and guinea-pigs, either with fresh dysenteric stools or with cultures by the amœbæ, were negative. Dogs and cats have been successfully inoculated by the bowel. Kartulis gives in detail his experiments upon cats. He concludes from his experiments that the amœbæ of dysentery are the sole causes of dysentery.

As control experiments he cultivated other bacteria found in dysenteric stools, among them the bacterium coli and the bacillus of the so-called green diarrhœa, and injected them into the bowel of young cats.

He also cultivated upon gelatin plates several microörganisms from dysenteric stools, and after he had convinced himself that there were no longer any amœbæ alive, he injected the cultivations *en masse* into the bowels of young cats.

He filtered dysenteric stools through flannel, which retains the amœbæ, and injected the filtrate into the rectum of cats.

A pure culture of the bacillus of Chantemesse and Vidal, obtained from their laboratory, was also injected into the bowels of young cats.

Finally, cats were fed upon the organisms mentioned. All these experiments had a negative result. Not one of the animals was taken sick with dysentery, and only in one instance was there a slight transient diarrhœa.

It yet remains for some one to find the amœbæ outside the body. Kartulis thinks it is probably to be found in water.—*Centralblatt für Bacteriologie und Parasitenkunde*, March 21, 1891.

SOCIETY PROCEEDINGS.

THE AMERICAN MEDICAL ASSOCIATION.

Forty-second Annual Meeting, held at Washington, D. C., May 5, 6, 7, 8, 1891.

[Continued from p. 540.]

FOURTH DAY—GENERAL SESSION.

THE closing session of the American Medical Association was held in the Opera House on May 8th, at 10.15 A. M. Dr. W. L. Schenck, of Kansas, not being present, his address on State Medicine was read by title, and referred to the Publication Committee. The President announced the following committee to memorialize Congress for the establishment of the new cabinet officer, the Secretary of Public Health: Drs. C. G. Comegys, Ohio, *Chairman;* J. F. Hubbard, Indiana; N. S. Davis, Illinois; J. C. Culbertson, Ohio; Dr. Richardson, Louisiana; W. B. Atkinson, Pennsylvania; C. A. Lindsley, Connecticut; C. A. Hughes, Missouri: W. T. Briggs, Tennessee; H. D. Didama, New York; Thomas B. Evans, Maryland; A. J. Stone, Minnesota; J. P. Logan, Georgia; W. W. Kerr, California; Charles Dennison, Colorado; W. L. Schenck, Kansas; P. O. Hooper, Arkansas; H. J. Swearinger, Texas; Wirt Johnson, Mississippi; T. F. Wood, North Carolina; J. N. McCormick, Kentucky; J. T. Reeve, Wisconsin; H. O. Walker, Michigan.

The report of the Committee on the Jenner Vaccination Centennial was received. Replies to the inquiries sent out by the committee to leading medical men of the various States were received from twenty-two of the States. The committee recommended the preparation of an eulogy on the great discoverer, and the reading of papers appropriate to the subject, and suggested as the day of celebration the 14th of May, 1896. The eulogist is to be selected by the committee, as well as an editor and compiler, the latter to collect and compile the literature of the subject, and to assume charge of all the scientific matter, and to publish all the material thus collected in a sumptuous volume with suitable illustrations.

Dr. N. S. Davis, of Illinois, moved that the report be adopted, and offered as a resolution that the committee be continued for another year, that the 14th of May, 1896, be appointed as the day of celebration, and that the meeting of the Association for that year be so arranged as to include the above date. Carried unanimously.

The President annnounced the following committee

to investigate the relation of contract railroad surgeons in the United States to the code of ethics of the medical profession, and to decide what action should be taken by the Association in reference to corporations employing surgeons only under such rules as were laid down by them: Drs. J. Ford Thompson, District of Columbia; R. G. Ellegood, Delaware; J. D. Fernandez, Florida; W. S. Powell, Georgia; B. M. Griffin, Illinois; J. F. Hibbard, Indiana; G. F. Jenkins, Iowa; W. L. Schenck, Kansas; J. M. McCormick, Kentucky; A. Garcelon, Maine; G. L. Taneyhill, Maryland; A. L. Norris, Massachusetts; J. E. Emerson, Michigan; P. A. Millard, Minnesota; T. F. Wood, North Carolina; G. P. Conn, New Hampshire; D. Benjamin, New Jersey; J. B. Roberts, Pennsylvania; W. P. Porcher, South Carolina; T. J. Hoppell, Tennessee; D. R. Wallace, Texas; D. C. Hawley, Vermont.

The subject of the incorporation of the Association elicited some interesting discussion. Dr. Hibbard, of Indiana, moved that a committee of seven be appointed to consider the question of the incorporation of the Association, and to report at the next annual meeting. Carried.

President Taylor, of the American Pharmaceutical Association, and Professor Remington, of Philadelphia, were invited to the platform, and made short addresses.

The report of the Secretary on State Medicine was received, and adopted as read.

Dr. N. S. Davis, chairman of the Judicial Council, reported that the subjects assigned to the Council were under judicious consideration, and that the report would be submitted at the next annual meeting.

The President announced the appointment of the officers of the various sections, and introduced Dr. R. H. Marcy, of Boston, the President elect, who delivered a short address of thanks, and appreciation of the honor conferred upon him.

The General Session then adjourned.

SECTION OF THERAPEUTICS AND PHARMACY.

The second day's meeting of the Section of Therapeutics and Pharmacy discussed the following proposition of Dr. Rice, of New York, to create "A Joint Committee on Therapeutics and Pharmacy:"

The new movement of establishing closer and official relations between the two professions of medicine and pharmacy promises to yield beneficial results, and has been started at a time when its desirability, or rather necessity, is generally recognized. Both professions have many interests in common, and both have to supplement each other by their special knowledge and attainments. Many are the topics—ethical, legal, historical, politico-economical, hygienic, statistical, educational, social, and particularly scientific (omitting "financial")—which can and will be profitably discussed at joint meetings of representatives of the two professions; and some of these topics may even be said to form burning questions which have hitherto been treated by the medical and pharmaceutical press, mostly in an *ex parte* manner. It is hoped that these may hereafter be brought to a solution satisfactory to all.

But the discussion of professional topics, or the reading of papers thereon, at the joint annual meetings, does not seem to be sufficient to infuse life into a co-partnership such as it is proposed to establish and maintain between the two professions. Something else of a more lasting and permanent interest—something of tangible utility, so to say, seems to be wanted to serve as a firmer bond. In the judgment of the writer, such a bond can be established—and, indeed, its want has long been felt—by the official interchange of, and decision on, professional or scientific problems between the two professions. The physician as well as the pharmacist each possesses, if properly trained, a fund of special knowledge, often laboriously acquired and constantly augmented by daily practice and experience, which, in these days of rapid progress, can no longer be expected to be met with, combined in one and the same person, but which has to be gathered and studied by specialists for the benefit of the other members of their own, or a kindred profession. Yet it is an indisputable fact that many important facts which have long been known to, or recognized by one profession, and which yet virtually concern the other, remain often entirely unknown, or only imperfectly known to the latter for a long time. If there were an official channel, through which such needful information could be conveyed, at regular intervals, from one profession to the other, much would thereby be gained. It may be well to mention an example by way of illustration. Many physicians are in the habit of prescribing aconitine without specifying what kind they intend. They are not aware that there are four or five different kinds in the market, each of them in vogue or preferred in some particular country or locality—one being the pure, crystallized alkaloid of exceedingly great power; another an amorphous substance of comparatively feeble strength; another one, made by a different process, or perhaps from a different kind of aconite, being of an intermediate strength, etc.—and that they are liable to have the most powerful dispensed when they perhaps intended the weakest, or *vice versa*. Would it not be useful to present to the medical profession, once a year at least, a concise summary of important matters of this kind, which would suggest themselves from time to time? As a rule, physicians do not read pharmaceutical journals or circulars issued by chemical houses; hence, information regarding subjects like that above-mentioned often reaches them only when some serious accident has happened. If there were a source of information on topics of this kind, prepared by pharmacists specially for the benefit of physicians, much good would result. On the other hand, physicians often observe objectional features connected with the form or efficacy of pharmaceutical or Galenical preparations—as, for instance, deficiency of therapeutic action due to improper menstrua, improper vehicles, improper coating, etc. The same medium of communication could be used for drawing the attention of the pharmacists to these matters.

If it is conceded that such a mutual exchange of information or of problems is desirable, it will not be difficult to devise a plan by which it may be carried out. The writer suggests the following, at least as a basis upon which something better may be erected:

1. The American Medical Association, through its proper Section [or in any other way that may be determined on] may annually appoint seven [or any other number] members, who, together with a like number

of pharmacists, who may be appointed by the American Pharmaceutical Association, shall constitute the "Committee on Therapeutics and Pharmacy."

2. This committee shall elect a chairman and vice-chairman, only one of whom shall be chosen from the same profession. These two officers shall also be the chairmen of their respective sections (medical and pharmaceutical) in the committee.

3. The committee may either hold joint sessions at such times as may be agreed upon, or it may transact its business by correspondence.

4. Either section of the committee shall be authorized and instructed to consider any professional questions or problems which may be submitted to it by the other; and, after deliberation, to give such an opinion, or such a decision, as the subject may warrant, from the standpoint of the profession rendering the opinion or decision.

5. The section of the committee making the request or appeal shall bring the reply or decision of the other to the knowledge of the whole of its own profession, or, when this is unnecessary or inadvisable, at least to the notice of those to whom it more particularly applies.

6. The committee, or, if so determined by it, either or both of its sections separately, shall annually report, at the joint meeting of the two professions [or, say, to the Section on Materia Medica and Pharmacy of the American Medical Association], the nature of the questions and problems mutually submitted, if any, and the respective opinions or decisions rendered. These decisions shall be subject to a revision, if one is called for, at this meeting.

7. Each section of the committee shall annually present a report upon professional topics which it may be thought particularly necessary to bring to the attention of the other profession. Thus, the Section on Pharmacy may present, for instance, a report on new remedies, accompanied by practical suggestions as to their best mode of administration, as to precautions to be observed in prescribing them, as to incompatibilities to be avoided, and similar topics. And it may submit questions or problems involving *therapeutics as it affects pharmacy* to the other section, with a view of having them answered or decided. The Section on Therapeutics may, in its turn, present problems or questions involving *pharmacy as it affects therapeutics* to the other section, for solution or answer.

In presenting this plan, the writer had in view scientific, professional topics rather than ethical ones. There is no doubt that the latter will form an abundant source of discussion, and that this will, if properly conducted, bring the two professions closer together; but it will, under most circumstances, be preferable to relegate such topics to the general annual meeting, there to be fully discussed and decided, rather than to have them passed upon by a small subcommittee, the action of which may, after all, not be finally indorsed by the Association. On the other hand, a reversal of any decision by the committee, on scientific topics, rendered after proper study and discussion, is scarcely to be apprehended.

It may not be found practicable to carry out the above plan, or something similar to it, at once. Moreover, at this first meeting of the two professions, there may not be sufficient time to discuss it properly. In this case, it may be held over for the next meeting, and those who take an interest in the matter may, in the meantime, carefully examine it, so as to be prepared to offer improvements, should it ever be brought up for action.

SECTION OF PRACTICE OF MEDICINE AND PHYSIOLOGY.

DR. J. S. NOWLIN, of Shelbyville, Tenn., read a report on an "Epidemic of Cerebro-spinal Meningitis." From the symptoms in these cases, and the results from the use of quinine, the speaker drew the conclusion that the so-called cerebro-spinal meningitis is really a manifestation of malaria.

Dr. Dock said he did not believe the author meant to imply that all epidemics of the disease in question are malarial, since some of them occur in places and at times when the severe manifestations of malaria do not appear. It was important, however, to bear in mind that malaria can produce any and all the symptoms common to inflammatory diseases of the central nervous system. These cases can be properly distinguished by the microscopic examination of the blood, and the recognition of them is of the greatest importance, since in the malarial cases quinine must be used, no matter how severe the symptoms are, nor how greatly they resemble those of inflammatory disease; and not only is this without harm, but with the result of early recovery.

DR. W. B. DAVIS, of Cincinnati, read a paper on "The Prevalence of Albuminuria in Persons Apparently Healthy," indicating the belief that albuminuria is very common, and not pathognomonic of nephritis.

Dr. Eccles, of Brooklyn, said he had found albumin in the urine of persons without nephritis.

The Secretary read a paper by DR. J. F. JENKINS, of Tecumseh, Mich., on "The Treatment of Spasmodic Asthma by the Fluid Extract of Euphorbia Pilulifera."

Dr. Aulde described his method of using the drug, and the success following it.

DR. KARL VON RUCK, of Asheville, N. C., presented a paper on "Professor Koch's Method for the Cure of Tuberculosis, and its Results in Pulmonary and Laryngeal Cases," claiming for the remedy, in connection with other means, a positive and curative therapeutic action.

This was followed by a paper by DR. S. P. KRAMER, of Cincinnati, with "A Report of Cases Treated with Tuberculin in the Good Samaritan Hospital," the results being favorable.

Dr. Simonton, of California, said he thought the reaction now taking place in regard to this remedy would subside, and that the profession would settle down to a realization of its value as the best remedy for tuberculosis in proper cases. Its diagnostic value, the speaker said, was not absolutely fixed, but was sufficient to make it one of the methods to be used.

Dr. Osler gave an outline of the results obtained in the Johns Hopkins Hospital. On the whole, his experience had been disappointing.

Dr. Eccles thought that Koch would yet discover the cure for tuberculosis; that he was at present in the position of Columbus on his second voyage.

Dr. Welch gave a description of the histological appearances in the cases in which tuberculin had been used.

The Chairman described the beneficial results obtained by injecting a toxic substance from a hitherto undescribed bacterium in phthisical subjects. Drs. Von Ruck and Kramer concluded the discussion.

DR. CHAS. H. SHEPARD, of Brooklyn, N. Y., read a paper on "The Action of the Turkish Bath in Disease."

DR. GEORGE DOCK, of Galveston, Texas, gave an abstract of a paper on "The Malarial Parasites, and the Forms of Disease in which They Occur in Texas."

Dr. Osler spoke of the great practical value of such studies, and of their special value in the elucidation of the nondescript fevers of the South. He said that in certain cases he had been unable to distinguish between typhoid fever and malarial remittent, except by the microscopic examination of the blood. He considered it especially gratifying to see that in Germany, where scepticism of the significance of the discovery of Laveran had long prevailed, they were now coming around, and that the situation has been accepted in Koch's laboratory.

DR. W. J. HERDMAN, of Ann Arbor, read a paper on "Electricity Therapeutically Considered," advocating the use of commercial currents rather than the products of instrument-makers.

Dr. Davis thought the use of such currents dangerous, on account of the possibility of falling wires.

Dr. Herdman showed that by the use of a fusible metal plug such accidents would be harmless.

Several papers were read by title and several more referred to the publishing committee.

The Chairman announced that at the request of Dr. W. W. Johnston, of Washington, the committee appointed last year to investigate the Fevers of the South would be continued for another year.

Dr. Woodbridge, of Ohio, chairman of the committee of three appointed to confer with similar committees from other Sections, reported that the Section chairmen were requested to appoint committees of three, to advise with the Section officers on papers submitted to the Sections, and that the original conference committees be continued for another year.

The report was adopted and the Chairman appointed as the advisory committee, Drs. Osler, of Baltimore; Herdman, of Ann Arbor; and Dock, of Galveston.

The Nominating Committee reported the election of the following Section officers for the ensuing year: Dr. Eads, of Washington, chairman; Dr. French, of Cincinnati, secretary.

On motion of Dr. Woodbridge, of Ohio, a vote of thanks was tendered the officers, and the Section then adjourned.

SECTION OF NEUROLOGY AND MEDICAL JURISPRUDENCE.

The meeting was opened by a paper on "Paretic Dementia and Life Insurance," by DR. JAMES G. KIERNAN, of Chicago. He said that the increase in paretic dementia had raised a question as regards life insurance. As an instance, he cited the case of a man who was taken to a noted alienist by his brother. Upon a careful examination of the case, the alienist pronounced it one of paretic dementia, and said that the patient would not live more than three years. The brother at once had the afflicted brother's life insured, concealing his condition from the insurance company's examiner, who was not sufficiently skilled to detect the disease. Later the patient died, and the company was compelled to pay the insurance. He spoke of other instances of the same character. According to the speaker, many of these mistakes are made by examiners who are inefficient, and have been appointed through influence rather than professional merit. According to a legal decision by the Iowa courts, insurance companies are responsible for these mistakes, and must pay the insurance. Dr. Kiernan thought it unjust that the insurance companies should have to pay in cases of this kind, but also blamed them for employing medical examiners who were not capable of detecting the early symptoms of this disease.

DR. N. ROE BRADNER, of Philadelphia, next read a paper upon the "Private Treatment of Insanity." He said that our public asylums were institutions of the greatest value, but that the time had come when the private treatment of the insane must demand greater attention. Dr. Bradner objected to our public asylums on the ground that the medical attention was not sufficient, as the physicians in charge always had many more patients than they could properly attend to, and as a consequence many cases, which might be benefited by treatment, became incurably insane because of this neglect. He considers that many of our public asylums are simply places of detention. His reasons for favoring the treatment of the insane in private institutions are, that the physicians in charge do not have a greater number of patients than they can properly attend to; that the educated and refined are not thrown together with the lower classes of society, as is often the case in public institutions; that the restraint is not so severe, and is better adapted to each patient. Another objection to public asylums was the class of attendants found in many of these institutions, who are often secured because of their "brute force" and the cheapness of their service. Dr. Bradner thinks that the attendants and physicians in these institutions should be especially educated.

The speaker then took up the consideration of a new law proposed in Pennsylvania by Judge Brewster, providing for a jury of twelve laymen, who should judge as to the sanity of a person before his committal to an asylum. He said that a law similar to the one proposed by Judge Brewster was now in operation in Illinois. His objections to this law were that laymen were not capable of acting as judges in these cases; that there was loss of time in the treatment of acute mania, which should be promptly treated, and that it was a great injustice to the families of these afflicted persons to give such publicity to their unfortunate condition.

In conclusion, he said that the private asylums of our country will increase in number, which, he thinks, will be a great benefit to society.

Dr. Kiernan, of Chicago, and Dr. Hughes, of St. Louis, both thought that Dr. Bradner's criticism on the public asylums of this country was unjustly severe.

The next paper was upon the "Studies of Cranial Degeneracy and Aberrant Maxillary Development in the Criminal Class," by DR. G. FRANK LYDSTON and DR. E. S. TALBOT, of Chicago, Ill.

Dr. Lydston took up the part of the subject relating to cranial degeneracy, which, he said, had not been studied to any extent in this country. He believes the external conformation of the calvarium was not always indicative of the cerebral development, but in many cases it formed a very good basis for judgment. He

said that simplicity in the type of the cerebral gyri was always indicative of cerebral degeneracy. In the criminal classes the striking feature of the skull is its greater breadth and decrease in the height of the vertical index, and its asymmetry. A condition that he has noticed in the skulls of the criminal class is a peculiar appearance as though it had been twisted upon itself. He then considered the conformation of the skulls of various races, after which he exhibited a series of skulls of criminals.

In conclusion, he said that the criminal usually had a bad heredity, and in addition to the cerebral aberration in these cases there was often physical degeneracy. The most aberrant types of skulls were found in criminals of foreign birth. Another peculiarity that he has discovered is the relatively greater aberrant development of the nose among criminals than in the ordinary individual. In the majority of instances where there is defective bony development there will be found cerebral degeneracy.

Dr. Talbot took up the second part of the paper and spoke upon aberrant maxillary development in the criminal classes. He showed a number of drawings illustrating the peculiarities of the inferior and superior maxilla in skulls of criminals. He also said that in conjunction with a defective cerebral development, there was usually either a deficiency or excess in the growth of the osseous system. His studies have been very extensive upon this subject. Among the various classes of society he had found an abnormality in the growth of the maxillary bones as follows: In the insane 90 per cent. have normal maxillary bones; the Hebrew race 74 per cent. normal; of a large number of Harvard dispensary patients, 60 per cent. were normal; in idiots, 55 per cent. were normal; in the blind, 50 per cent.; and in the deaf and dumb, 45 per cent. were normal; lastly, in the criminal class, among whom only 34 per cent. were found to have normal maxillary bones.

DR. O. EVERTS, of Cincinnati, next read a paper entitled "Increase and Prevention of Insanity;" after which DR. W. H. WILLING, of Philadelphia, exhibited two batteries and read a paper upon "Electro-diagnosis in Brain and Nerve Injuries."

DR. STEPHEN LETT, of Guelph, Canada, read a paper upon the "Treatment of Opium Neuroses." He condemned the abrupt mode of treatment in the strongest terms, and favored the method by gradual reduction. His method of treatment is according to that of Dr. Hubbard, of Brooklyn, with a few modifications. He thinks that the "vice theory" of the opium habit should be discarded, and that it should be considered purely as a disease. He says that there is no drug that can cure this condition, and that substitutes are dangerous and should not be employed. He first ascertains the amount of opium used by the patient in twenty-four hours, and then reduces this to an equivalent of morphia, which is always substituted regardless of the preparation of opium which the patient has used. The rate of reduction depends upon the character of the case. In those cases where large quantities of opium are used the reduction is faster, while in cases where the amount used is small, the rate of decrease is proportionately slow. In a case where twenty grains of morphine are used in twenty-four hours, he reduces the amount at the rate of one grain in about three days. When the amount is reduced to one grain, three or four weeks are required before it is entirely stopped. As a result of this gradual method of treatment there is no shock, no gastric disturbance, little or no diarrhœa, no restlessness, and the sleep is good. The speaker does not favor the use of bromide of potassium, alcohol or cocaine during the treatment, but depends entirely upon nourishing food to sustain his patient's strength.

DR. W. S. WATSON, of Matteawan, N. Y., followed with a paper on "Opium Inebriety, its Legal Recognition and Treatment." This speaker advocated the same plan of treatment as Dr. Lett, with some slight modification.

Extracts from a paper sent to the Neurological Section by DR. R. BURKART, of Bonn, Germany, on "Brain Diseases from Opium," were read by Dr. J. B. Mattison, of Brooklyn, N. Y.; following which he read a paper written by himself on "The Prevention of Opium Inebriety." This speaker spoke in the highest terms of the use of codeine and narceine, especially the former, instead of morphine. He claims that codeine has all the advantages of morphine without its disadvantages. This drug, according to the speaker, produces sleep and allays pain without inducing that peculiar effect that is so fascinating to the morphio-maniac. He does not deny that the codeine or narceine habit may be contracted, but thinks it is far less likely to follow the use of these drugs than is the morphia habit from the use of morphine.

He says that one-fourth of a grain of codeine hydrochlorate, hypodermically, or one-half of a grain of the sulphate by the mouth, are perfectly safe.

No bad effects follow the use of this drug, and it is in every way superior to morphine.

OBITUARY.

DR. JOSEPH LEIDY, M.D., LL.D., Professor of Anatomy and Director of the Biological Department of the University of Pennsylvania, died early on the morning of Thursday, April 30th, of uræmia and pachymeningitis.

Dr. Leidy was born in 1823, and during the early years of his life lived upon a farm, where he had the opportunity of developing his great love for the study of Nature. After having been educated in the common schools, he studied medicine in the University of Pennsylvania, and was graduated in 1844, studying anatomy in the meantime under Dr. James McClintock and Dr. P. B. Goddard. During his student days, and afterward for several years, he was an active assistant of the well-known investigator and chemist, Dr. Robert Hare, and also of Professor Horner, who then held the Chair of Anatomy in the University of Pennsylvania. Before he had studied medicine, Dr. Leidy had fully mastered the subject of botany, ample evidence of which is given in his later contributions to science. To give in the brief space which we have at our disposal anything like a complete biography of this celebrated man would be absolutely impossible. During the fifty-seven years that he was a member of the medical profession he contributed to science no less than eight hundred papers, which were at once widely diverse and eminently scientific. While he was known to medical

students as a professor of human anatomy, his intimate knowledge of the formation of man's body was as nothing to his wonderful knowledge concerning all forms of animal life, both microscopical and otherwise. In addition to being a comparative anatomist, he was *facile princeps* palæontologist of the United States. His investigations upon this subject provided the doorway through which all other researches have been carried on. Beginning at a time in the history of this country when no one dreamed of the vast scientific discoveries which have since been made in the West, he not only determined correctly the nature of all those fossils, as well as other remains of extinct species which were brought to him, but prophesied with singular fidelity that other discoveries would confirm his opinions, although years might elapse before they were made.

One of the most remarkable facts in regard to the career of Dr. Leidy, was the invariable confirmation of his views. Frequently a space of twenty or thirty years would elapse during which he would remain steadfast in his beliefs against all criticism, and come out victor in the end. As a helminthologist, Dr. Leidy occupied a position in the first rank, and was so regarded by Deising, of Vienna, the highest authority on that subject, who practically devoted his whole lifetime to this one subject—the study of helminthology. One of Dr. Leidy's most important contributions to this branch of zoölogy was his discovery of the Trichina spiralis in the pig, which Leuchart admits suggested to him his discovery of trichinosis in man. Dr. Leidy's study of the parasites affecting the lower animals was equally as thorough as were his researches concerning the animals affecting man, and the intestinal canal of the cockroach and centipede and other similar forms of life were the subject of a number of contributions to the publications of the Smithsonian Institution. In addition to the intimate knowledge of the subjects which we have mentioned, Dr. Leidy was one of the first authorities in the United States upon the subjects of geology and mineralogy. His knowledge of the value of precious stones was that of an expert. His power of observation and of remembering what he had seen were almost beyond the comprehension of ordinary individuals. It is said of him that on one occasion a rare plant was brought to him which had been found in Chester County, Pa., and that after examining it with some care, he remarked that he remembered to have found one of the same character thirty-five years before on the south side of a small strip of woods, which proved to be the position from which the second plant had been brought.

While Dr. Leidy did not make great epoch-making discoveries, his scientific work and the hundreds of minor discoveries which he made have placed him head and shoulders above all other naturalists which America has ever produced, and it is doubtful if the world has ever seen a man who was so thoroughly equipped and so intimately in touch with so many branches of natural science as was the subject of this sketch. In addition to the American honors which were conferred upon him, Dr. Leidy was a member of a large number of learned societies in Europe, and as long ago as 1865 was elected to membership in the following foreign bodies: Imperial Society of Naturalists, Moscow; Imperial Leopold-Charles Academy of Sciences, Jena; Royal Zoölogical and Botanical Society, Vienna; Royal Academy of Sciences, Münich; Royal Bohemian Society of Sciences, Prague; Biological Society, Paris; Geological, Zoölogical, and Linnæan Societies, London; Natural History Society, Dublin.

The most prominent contributions from the pen of Dr. Leidy are as follows: *Flora and Fauna within Living Animals*, 1 vol. 4to., pp. 67, plates 10, 1853; "Freshwater Rhizopods of North America," *U. S. G. Survey of the Territories*, Wash., 1879; *Ancient Fauna of Nebraska*, 1 vol. 4to., pp. 126, plates 24, 1853; *Memoir on the Extinct Sloth Tribe of North America*, 1 vol. 4to., pp. 68, plates 16, 1855; *Cretaceous Reptiles of the United States*, 1 vol. 4to., pp. 135, plates 20, 1865; *Extinct Mammalian Fauna of Dakota and Nebraska, together with a Synopsis of the Mammalian Remains of North America*, 1 vol. 4to., pp. 472, plates 30, 1869; *Contributions to the Extinct Vertebrate Fauna of the Western Territories*, 1 vol. 4to., pp. 358, plates 37, 1873; *Description of Vertebrate Remains from the Phosphate Beds of South Carolina*, 4to., pp. 52, plates 5, 1877. The greater part of his more important works have been issued through the Smithsonian Institution, the Academy of Natural Sciences of Philadelphia, and Hayden's United States Reports of Geological Surveys of the Territories.

OFFICIAL LIST OF CHANGES IN THE STATIONS AND DUTIES OF THE MEDICAL CORPS OF THE U. S. NAVY FOR THE WEEK ENDING MAY 9, 1891.

BRADLEY, G. P., *Surgeon.*—Detached from "Mohican," and placed on waiting orders.

T. C. WALTON, *Medical Inspector;* GEORGE A. BRIGHT, *Surgeon;* and J. M. STEELE, *Passed Assistant Surgeon*, ordered to Naval Academy, to examine applicants physically for admission.

DICKSON, S. H., *Surgeon.*—Ordered to the "Constellation."

LEACH, PHILIP, *Passed Assistant Surgeon.*—Detached from the Naval Academy, and ordered to the "Constellation."

RUSH, W. H., *Passed Assistant Surgeon.*—Detached from the "Saratoga," and await duty to sea.

ATLEE, L. W., *Passed Assistant Surgeon.*—Detached from Navy Yard, League Island, and ordered to the "Saratoga."

BROWNELL, C. D. W., *Assistant Surgeon.*—Ordered to Navy Yard, League Island.

COMMUNICATIONS are invited from all parts of the world. Original articles contributed exclusively to THE MEDICAL NEWS will be liberally paid for upon publication, or 250 reprints will be furnished instead of payment, provided request for reprints be noted by author at top of manuscript. When necessary to elucidate the text, illustrations will be provided without cost to the author.

Address the Editor: H. A. HARE, M.D.,
1004 WALNUT STREET,
PHILADELPHIA.

Subscription Price, Including Postage in North America.

PER ANNUM, IN ADVANCE . . . . . $4.00.
SINGLE COPIES . . . . . 10 CENTS.

Subscriptions may begin at any date. The safest mode of remittance is by bank check or postal money order, drawn to the order of the undersigned. When neither is accessible, remittances may be made, at the risk of the publishers, by forwarding in *registered* letters.

Address, LEA BROTHERS & CO.,
NOS. 706 & 708 SANSOM STREET,
PHILADELPHIA.